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Automatic electrical controls -
Part 2-6: Particular requirements for automatic electrical pressure sensing controls including mechanical requirements

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Automatic electrical controls - Part 2-6: Particular requirements for automatic electrical pressure sensing controls including mechanical requirements

FOREWORD

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IEC 60730-2-6 has been prepared by IEC technical committee 72: Automatic electrical controls. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2015 and its Amendment 1:2019. This edition constitutes a technical revision.

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

Adoption of IEC 60730-1:2022 with all of its significant changes to IEC 60730-1:2013, IEC 60730-1:2013/AMD 1:2015 and IEC 60730-1:2013/AMD2:2020.

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

Draft	Report on voting
72/1486/FDIS	72/1504/RVD

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

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

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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

This part 2-6 is intended to be used in conjunction with IEC 60730-1. It was established on the basis of the sixth edition of that standard (2022). Consideration may be given to future editions of, or amendments to, IEC 60730-1.

This part 2-6 supplements or modifies the corresponding clauses in IEC 60730-1, so as to convert that publication into the IEC standard: Particular requirements for automatic electrical pressure sensing controls including mechanical requirements.

Where this part 2-6 states "addition", "modification" or "replacement", the relevant requirement, test specification or explanatory matter in part 1 should be adapted accordingly.

When a particular subclause of Part 1 is not mentioned in this Part 2, that 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 reader's attention is drawn to the fact that Annex Q, Annex R, Annex S and Annex T list all of the "in-some-country" clauses on differing practices of a less permanent nature relating to the subject of this document.

In this publication:

The following print types are used:

– requirements proper: in roman type;
– *test specifications: in italic type*;
– explanatory matter: in smaller roman type;
– defined terms: **bold type**.

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

– reconfirmed,
– withdrawn, or
– revised.

1 Scope

This clause of Part 1 is replaced by the following:

This document applies to **automatic electrical** pressure **sensing controls**

– for use in, on, or in association with equipment for household appliance and similar use;

NOTE 1 Throughout this document, the word "equipment" means "appliance and equipment" and "controls" means "pressure **sensing controls**".

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

EXAMPLE 1 Independently mounted **automatic electrical** pressure **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 **Automatic electrical** pressure **sensing controls** for commercial catering, heating and air-conditioning equipment.

– that are **smart enabled automatic electrical** pressure **sensing controls**;

EXAMPLE 3 Smart grid **automatic electrical** pressure **sensing controls**, 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;

– 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 are mechanically or electrically operated, responsive to or controlling a pressure or vacuum;

– 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 is also applicable to individual pressure **sensing controls** utilized as part of a **control system** or pressure **sensing controls** which are mechanically integral with multi-functional controls having non-electrical outputs.

This document is also applicable to pressure **sensing controls** for appliances within the scope of IEC 60335-1.

This document applies to

– the inherent safety of pressure **sensing controls**, and

– functional safety of pressure **sensing controls** and safety related systems,

– pressure **sensing 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.

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

This document does not

– apply to pressure **sensing controls** intended exclusively for industrial process applications unless explicitly mentioned in the relevant part 2 or the equipment standard. However, this document can be applied to evaluate automatic electrical controls intended specifically for industrial applications in cases where no relevant safety standard exists;
– take into account the response value of an automatic action of a pressure **sensing 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 equipment standard or as determined by the manufacturer will apply;
– 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.

This document contains requirements for electrical features of pressure **sensing controls** and requirements for mechanical features that affect their intended **operation**.

NOTE Subclause 20.101, as it pertains to gas and/or oil controls, is under consideration pending review or revision of ISO 22967, ISO 22968 and ISO 23550, if applicable.

In general, these pressure **sensing controls** are integrated or incorporated with the equipment or are intended to be integrated in, or on the equipment. This document also covers these controls when they are independently mounted. **In-line cord controls** are not covered by this document.

2 Normative references

This clause of Part 1 is applicable.

3 Terms and definitions

This clause of Part 1 is applicable except as follows:

3.2 Definitions of types of control according to purpose

Additional definitions:

3.2.101
pressure limiter
pressure **sensing control** which is intended to keep a pressure below or above a predetermined value during normal operating conditions and which can have provision for setting by the user

Note 1 to entry: A **pressure limiter** may be of the automatic or of the manual reset type. It does not make the reverse operation during the normal duty cycle of the equipment.

3.2.102
pressure operating control
pressure **sensing control** set at a high or low pressure, or both, between which limits the equipment is normally intended to operate

3.2.103
pressure cut-out
pressure **sensing control** intended to keep a pressure below or above one particular value during abnormal operating conditions of the equipment and which has no provisions for **setting by the user**

Note 1 to entry: A **pressure cut-out** may be of the automatic or of the manual reset type.

Note 2 to entry: A **pressure cut-out** will provide a Type 2 action.

Note 3 to entry: A **pressure cut-out** may have an adjustable stop intended to be set by the **control manufacturer**, the **equipment manufacturer** or the **installer**.

3.3 Definitions relating to the function of controls

Additional definitions:

3.3.101
pressure medium
medium used to transmit the pressure to the pressure **sensing element**

Note 1 to entry: **Pressure medium** as used in this document refers to either gases or liquids.

3.3.102
permanent operation
continuous monitoring of the protective function during the **operation** of the appliance or **system** for longer than 24 h

Note 1 to entry: 24 h is considered the typical time interval between a first and a second **fault**.

3.3.103
non-permanent operation
continuous monitoring of the protective function during the **operation** of the appliance or **system** for less than 24 h

Note 1 to entry: 24 h is considered the typical time interval between a first and a second **fault**.

3.8 Definitions relating to component parts of controls

Additional definition:

3.8.101
vent
that opening from the atmospheric side of a diaphragm to the atmosphere through which air is discharged or drawn in when the control is functioning

4 General

This clause of Part 1 is applicable except as follows:

4.3 General notes on tests

4.3.2 Conditions of test

4.3.2.7 *Replacement*:

The rates of pressure change declared in Table 1 requirement 31, and used in Clause 19 (i.e. α_1, β_1, α_2, β_2) shall have test tolerances as declared by the manufacturer.

4.3.4 Instructions for test

4.3.4.1 According to submission

Additional subclause:

4.3.4.1.101 The values in Annex AA apply for the testing of independently mounted pressure **sensing controls** in Clause 19. Values for integrated and **incorporated controls** are specified in the appropriate equipment standard.

5 Required technical information

5.2 Methods of providing technical information

This clause of Part 1 is applicable except as follows:

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

	Information	Clause or subclause	Method
Replacement:			
19	Number of cycles of **actuation** (M) for each **manual action** Preferred values are: 100 000 cycles; 30 000 cycles; 10 000 cycles; 6 000 cycles; 3 000 cycles [j]; 300 cycles [j]; 30 cycles [j] NOTE For controls with more than one manual action, a different value can be declared for each. If a control has more than one intended "OFF" position, then a cycle of **actuation** is regarded as a movement from one "OFF" position to the next "OFF" position.	Annex AA, 19.10, 19.11	X
20	Number of automatic cycles (A) for each automatic action. Preferred values are: 300 000 cycles; 200 000 cycles; 100 000 cycles; 30 000 cycles; 20 000 cycles; 10 000 cycles; 6 000 cycles; 3 000 cycles[a]; 1 000 cycles[a]; 300 cycles[b]; 30 cycles[bd]; 1 cycle[c]. 1) Not applicable to thermostats or to other fast cycling actions. 2) Applicable only to manual reset. 3) Applicable only to actions which require the replacement of a part after each operation. 4) Can only be reset during manufacturer servicing. NOTE For controls having more than one automatic action, a different value can be declared for each.	Annex AA, 13.1.3.3, Table 14, 19.7.6, 19.8.4	X
29	Not applicable		
38	Not applicable		
42	Operating pressure (or pressures)	3.3.11, 17, H.17.4	
52	Not applicable		
Additional items:			
101	**Pressure medium**	3.3.101, 9.3.101, 20.101	X
102	**Operating differential**	3.3.25, H.17.4 H.17.6	D
103	**Maximum working pressure**	3.3.28, 9, 19, 20	D
Addition to Footnote h: For pressure **sensing controls**, limits of activating quantity are specified either in the applicable appliance standard, by the appliance manufacturer or as declared by the pressure **sensing control manufacturer** (see 19.7 and 19.8).			

6 Protection against electric shock

This clause of Part 1 is applicable.

7 Provision for protective earthing

This clause of Part 1 is applicable.

8 Terminals and terminations

This clause of Part 1 is applicable.

9 Constructional requirements

This clause of Part 1 is applicable except as follows:

9.4 Actions

Additional subclause:

9.4.101 Type 2.N action (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)

A Type 2.N action shall be so designed that in the event of a leak in the **sensing element**, or in any other part between the **sensing element** and the switch head, the declared disconnection or interruption is provided before the sum of the declared operating pressure and **drift** is exceeded.

Compliance is checked by the following test:

The operating pressure of a Type 2.N control shall be measured under the conditions of Clause 17. If the control has means for setting, it shall be set to the highest value.

*After this measurement, a hole is artificially produced in the **sensing element** and the measurement of the operating pressure is repeated.*

No positive drift is allowed beyond the declared value.

*A separate shroud or sleeve may be employed for protection of the **sensing element** to achieve conformance with Clause 20.*

NOTE The test can be replaced by theoretical computations of the physical mode of operation.

9.11 Requirements during mounting, use, maintenance and servicing

Additional subclauses:

9.11.101 Parts in contact with a diaphragm shall have no sharp burrs, projections or the like which chafe or abrade the diaphragm.

Compliance is checked by inspection before and after the tests of Clause 19.

9.11.102 An operating spring shall be retained and arranged to prevent abrasion, binding, buckling or interference with its free movement.