IEC 60730-2-15

Edition 3.0 2017-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Automatic electrical controls –
Part 2-15: Particular requirements for automatic electrical air flow, water flow and water level sensing controls

Dispositifs de commande électrique automatiques –
Partie 2-15: Exigences particulières pour les dispositifs de commande électrique automatiques détecteurs de débit d'air, de débit d'eau et de niveau d'eau

IEC 60730-2-15:2017-08(en-fr)

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CONTENTS

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AUTOMATIC ELECTRICAL CONTROLS –

Part 2-15: Particular requirements for automatic electrical air flow, water flow and water level sensing controls

FOREWORD

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International Standard IEC 60730-2-15 has been prepared by IEC committee 72: Automatic electrical controls.

This third edition cancels and replaces the second edition published in 2008. This edition constitutes a technical revision.

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

a) changes to align with the fifth edition of 60730-1, including the revised title.

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

FDIS	Report on voting
72/1080/FDIS	72/1101/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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

This Part 2-15 is intended to be used in conjunction with IEC 60730-1. It was established on the basis of the fifth edition of that standard (2013). Consideration may be given to future editions of, or amendments to, IEC 60730-1.

This Part 2-15 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 air flow, water flow and water level sensing controls.

Where this document 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 document indicates that the relevant clause or subclause of Part 1 applies.

In the development of a fully international standard to cover automatic controls for household and similar use, 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:

- 10.1.4,
- 12.1.101.

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 in the IEC 60730 series, published under the general title *Automatic electrical controls*, can be found on the IEC website.

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

AUTOMATIC ELECTRICAL CONTROLS –

Part 2-15: Particular requirements for automatic electrical air flow, water flow and water level 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 air flow, water flow and water level sensing controls for use in, or in association with, boilers with a maximum pressure rating of 2 000 kPA (20 bar) and equipment for general household and similar use including controls for heating, air-conditioning and similar applications.

NOTE Examples are water flow and water level sensing controls of the float or electrode-sensor type used in boiler applications and air flow, water flow and water level sensing controls for swimming pool pumps, water tank pumps, cooling towers, dishwashers, washing machines, air conditioning chillers and ventilation applications.

This document also applies to automatic electrical air flow, water flow and water level 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.

1.1.1

Replacement:

This document applies to the inherent safety, to the operating values, operating sequences where such are associated with equipment protection, and to the testing of automatic electrical air flow, water flow and water level sensing controls used in, or in association with, equipment.

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

Automatic electrical air flow, water flow and water level sensing 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 document.

This document 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.

This document is not applicable to pressure sensing controls, requirements for which are contained in IEC 60730-2-6[1].

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[1] IEC 60730-2-6, *Automatic electrical controls – Part 2-6: Particular requirements for automatic electrical pressure sensing controls including mechanical requirements.*

This document does not apply to air flow, water flow and water level sensing controls designed exclusively for industrial applications unless explicitly mentioned in the relevant equipment standard.

NOTE Throughout this document, the word "equipment" means "appliance and equipment".

1.1.2 *Addition:*

This document applies to automatic electrical controls, mechanically or electrically operated, responsive to or controlling air flow, water flow and water level.

1.1.3 Not applicable.

NOTE Requirements for manual switches not forming part of an automatic control are contained in IEC 60669 and IEC 61058-1.

1.1.5 *Replacement:*

This document applies to a.c. or d.c. automatic electrical air flow, water flow and water level sensing controls with a rated voltage not exceeding 690 V a.c. or 600 V d.c.

1.1.6 *Replacement:*

This document takes into account the response value of an automatic action of a control where such a response value is dependent upon the method of mounting the control. 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.

1.1.7 *Replacement:*

This document applies also to controls incorporating electronic devices, requirements for which are contained in Annex H.

This document applies also to controls using NTC and PTC thermistors, requirements for which are contained in Annex J.

2 Terms and definitions

This clause of Part 1 is applicable except as follows:

2.2 Definitions of types of control according to purpose

Additional definitions:

2.2.101
boiler water level cut-out
water level **sensing control** of the float or electrode-sensor type for boiler applications intended to respond to a low water level during abnormal operating conditions and which has no provision for **setting by the user**

Note 1 to entry: A water level cut-out may be of the automatic or of the manual reset type. A boiler water level cutout is a type of **water level protective control** (see 2.2.105).

2.2.102
boiler water level limiter
water level **sensing control** of the float or electrode-sensor type for boiler applications which is intended to keep a water level below or above one particular value during normal operating conditions and which may have provision for **setting by the user**

Note 1 to entry: A **boiler water level limiter** is normally of the automatic reset type.

2.2.103
boiler water feed control
water level **sensing control** of the float or electrode-sensor type for boiler applications which is intended to keep the water level in a boiler above one particular value during normal operating conditions and which may have provision for **setting by the user**

Note 1 to entry: A **boiler water feed control** is of the automatic reset type. A **boiler water feed control** is used on a boiler to cycle a feeder pump or feeder water valve. For the purposes of this document, a type 2 **boiler water feed control** is considered to be a **boiler water level limiter**.

2.2.104
water level operating control
control which is intended to keep the water level below or above one particular value during normal operating conditions and which may have provision for **setting by the user**

Note 1 to entry: A **water level operating control** is of the automatic reset type.

2.2.105
water level protective control
control which is intended to prevent a hazardous situation during abnormal **operation** of the equipment either by

a) keeping the water level below or above one or more particular values, or by
b) energizing or de-energizing the associated equipment at one or more particular values of water level

2.2.106
water flow operating control
flow **sensing control** intended to sense or maintain the water flow between two particular values during normal operating conditions and which may have provision for **setting by the user**

Note 1 to entry: A **water flow operating control** is of the automatic reset type.

2.2.107
air flow operating control
flow **sensing control** intended to sense or maintain the air flow between two particular values during normal operating conditions and which may have provision for **setting by the user**

Note 1 to entry: An **air flow operating control** is of the automatic reset type.

2.2.108
water flow cut-out
flow **sensing control** intended to respond to a lack of water flow during abnormal operating conditions and which has no provision for **setting by the user**

Note 1 to entry: A **water flow cut-out** is of the automatic or manual reset type.

2.2.109
air flow cut-out
flow **sensing control** intended to respond to a lack of air flow during abnormal operating conditions and which has no provision for **setting by the user**

Note 1 to entry: An **air flow cut-out** is of the automatic or manual reset type.

2.3 Definitions relating to the function of controls

Additional definition:

2.3.101
response delay
delay provided to increase the response value of a **water level operating control** for the purpose of preventing unnecessary cycling of the equipment due to fluctuating liquid level

Note 1 to entry: This is usually expressed in units of time.

3 General requirements

This clause of Part 1 is applicable.

4 General notes on tests

This clause of Part 1 is applicable except as follows:

4.1 Conditions of test

4.1.7 *Addition:*

The rates of change of level or flow declared in Table 1 and used in Clause 17 (i.e. α1, β1, α2, β2) shall have test tolerances as declared by the manufacturer.

4.3 Instructions for test

Additional subclause:

4.3.1.101 The values in Table AA.1 apply for the testing of independently mounted water level **sensing controls** used in boiler applications in Clause 17 unless a higher number is declared. The values in Table CC.1 apply for the testing of independently mounted air and water flow **sensing controls** in Clause 17 unless otherwise declared. Values for integrated and incorporated **controls** are specified in the appropriate equipment standard.

4.3.5.1 *Modification:*

The second sentence is not applicable to combinations of boiler water level **sensing controls** using a common sensing mechanism.

5 Rating

This clause of Part 1 is applicable.

6 Classification

This clause of Part 1 is applicable except as follows:

6.3 According to their purpose

6.3.9

Additional subclauses:

6.3.9.101 – boiler water level cut-out;

6.3.9.102 – boiler water level limiter;

6.3.9.103 – boiler water feed control;

6.3.9.104 – water level operating control;

6.3.9.105 – water level protective control;

6.3.9.106 – air flow operating control;

6.3.9.107 – water flow operating control;

6.3.9.108 – air flow cut-out;

6.3.9.109 – water flow cut-out.

6.4 According to features of automatic action

6.4.1

Additional subclause:

6.4.1.101 – **Boiler water feed controls** within the scope of this document are classified as having **type 1 action**.

For the purpose of this document, a **type 2 boiler water feed control** is considered to be a **boiler water level limiter**.

6.4.2

Additional subclause:

6.4.2.101 – **Boiler water level cut-outs** and **boiler water level limiters** within the scope of this document are classified as having **type 2 action**.

6.4.3

Additional subclauses:

6.4.3.101 – manual reset boiler water level **sensing controls** within the scope of this document shall have a trip-free mechanism classified as type 2.D, 2.H or 2.J action;

6.4.3.102 – an action incorporating **response delay** (type 1.AJ or 2.AJ).

6.5 According to the degree of protection and control pollution degree

6.5.2 *Addition:*

Controls declared in Table 1, requirement 107, to be wholly or partially submerged in water during usage shall have enclosures classified as IPX8 which provide protection against continuous immersion in water as specified in IEC 60529.

7 Information

This clause of Part 1 is applicable except as follows:

Table 1 – (7.2 of edition 3) – Required information and methods of providing information

Information	Clause or subclause	Method
Modifications:		
23 Temperature limits of mounting surfaces (T_s)	6.12.2, 14.1, 17.3	D
27 Number of automatic cycles (A) for each **automatic action** [101]	6.11, 17.8, 17.9	X
34 Not applicable		
44 Not applicable		
Additional requirements:		
101 Maximum fluid temperature (T_L) in °C	14.5.1	D
102 Response time, if applicable, for boiler water level **sensing controls**	15	C
103 Maximum working pressure, if applicable	2.3.29, 18.102	C/D[104]
104 Method of determining response time for boiler water level **sensing controls**	15.6.101	X
105 Test method for 18.101.2 for boiler water level **sensing controls**	18.101.2	X
106 Any special environmental conditions in which the **control** is intended to be used (other than declared in Table 1, requirement 15)[102]	12.1.101	D
107 Cord-connected float **control** which may be wholly or partially submerged in water or any other special environmental conditions declared in requirement 106	6.5.2, 11.7.1.1, 11.7.1.2.1, 11.7.1.2.2, 12.1.101	D
108 **Response delay**	2.3.101, 6.4.3.102, 11.4.101, H.11.12.8, Table BB.1	D
109 Unique or common type reference of special mounting means, if any[103]	11.6.3.1	C
110 Leveling indication for mounting, if any	11.11.101	C

Additional notes:

[101] The minimum number of automatic cycles is 6 000 for water level **sensing controls** of the float type.

[102] This information may be taken from the appropriate IEC equipment standard or may be as declared by the manufacturer.

[103] The unique or common type reference(s) shall be marked on both the mounting means and the **control**.

[104] Method C is required for air flow, water flow and boiler water level **sensing controls**.

Modification in Note i of the table:

Replace "Air flow" *with* "Air flow or water flow".

Addition to Note i:

For water level **controls**, limits of activating quantity are specified either in the applicable household appliance standard, by the appliance manufacturer or as declared by the water level **control** manufacturer (see 17.7 and 17.8).

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 except as follows:

10.1 Terminals and terminations for external copper conductors

10.1.4 *Additional note:*

NOTE 101 In Canada and the USA, **controls** for operation above 50 V shall be provided with suitable wiring terminals or leads for the connection of fixed wiring conductors having an ampere rating of no less than:

- 1,25 times the ampere rating of a fixed electric space-heating equipment load;
- 1,25 times the full-load motor current rating of a single motor;
- 1,25 times the combination load of a full-load motor current and 1,25 times a fixed electric space-heating equipment load;
- 1,25 times the full load current of the largest motor plus the full load amperes of the other loads;
- 1,0 times all other loads.

Compliance is checked by inspection.

11 Constructional requirements

This clause of Part 1 is applicable except as follows:

11.4 Actions

11.4.11 Type 1.H or 2.H action

Modification:

Delete the last sentence of the first paragraph.

11.4.12 Type 1.J or 2.J action

Modification:

Delete the last sentence of the first paragraph.

Additional subclause:

11.4.101 Type 1.AJ or 2.AJ action

A type 1.AJ or 2.AJ action shall be designed such that a **response delay**, as declared, is provided.

For type 2.AJ action, **response delay** is checked by the test of 15.5.

11.7 Attachment of cords

11.7.1 Flexing

11.7.1.1 *Addition:*

For **controls** declared in Table 1, requirement 107 the appropriate test of 11.7.1.2.1 shall be conducted.

Additional subclause:

11.7.1.2.1.101

Controls declared in Table 1, requirement 107, are subjected to the following test only.

Three samples of **controls** declared in Table 1, requirement 107, shall be subjected to a flexing test while mounted in the flexing apparatus shown in Figure 9. The cord, without any additional weight, shall be subjected to a minimum backward and forward movement through an angle of 90°. The cord shall be conducting the maximum rated current at maximum rated voltage. The number of flexings (that is one movement through 90°) shall be 30 000 at a rate of 60 flexings per minute.

*Immediately following the flexing test, the **control** shall be subjected to the following immersion test:*

*The **controls**, including their cords, shall be immersed and maintained in water or other special environmental condition as declared in Table 1, requirements 106 and 107 at T_L for seven days such that the water, or other environmental condition, is at least 1 m above the highest point of the float **control**.*

11.7.1.2.2 *Addition:*

*For **controls** tested in accordance with 11.7.1.2.1.101, the following evaluation criteria are used: After the test, the **control** shall comply with the requirements of Clause 8, 12.3 and Clause 13 for basic insulation, and there shall be no evidence of ingress of the test medium, compliance for which is checked by inspection.*

11.11 Requirements during mounting, maintenance and servicing

Additional subclause:

11.11.101 If the operation of a type 2 water level **control** of the float type is affected by its being placed out of level, the **control** shall be provided with a leveling indicator (e.g. a bubble, pendulum, horizontal or vertical line).

Compliance is checked by inspection and the test of 15.5.

Additional subclauses:

11.101 Construction requirements relating to operating mechanism

11.101.1 Screws and nuts which attach parts to movable members shall be swaged or otherwise locked.

NOTE For example, this would apply to the float hinge pivot of a water level **sensing control**.