



BSI Standards Publication

Automatic electrical controls

Part 2-8: Particular requirements for electrically operated water valves, including mechanical requirements

National foreword

This British Standard is the UK implementation of EN IEC 60730-2-8:2020/A1:2021. It is identical to IEC 60730-2-8:2018, incorporating IEC amendment 1:2021. It supersedes BS EN IEC 60730-2-8:2020, which will be withdrawn on 29 November 2024.

The text of IEC amendment 1:2021 has been provided in its entirety at the end of this document. BSI's policy of providing consolidated content remains unchanged; however, in the interest of expediency, in this instance BSI have chosen to collate the relevant content at the end of this document.

The UK participation in its preparation was entrusted to Technical Committee CPL/72, Electrical control devices for household equipment and appliances.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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UK Government is responsible for legislation. For information on legislation and policies relating to that legislation, consult the relevant pages of www.gov.uk.

© The British Standards Institution 2022
Published by BSI Standards Limited 2022

ISBN 978 0 539 15420 7

ICS 97.120

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2021.

Amendments/corrigenda issued since publication

Date	Text affected
31 March 2022	Implementation of IEC amendment 1:2021 with CENELEC endorsement A1:2021

FINAL VERSION**VERSION FINALE****Automatic electrical controls –****Part 2-8: Particular requirements for electrically operated water valves,
including mechanical requirements****Dispositifs de commande électrique automatiques –****Partie 2-8: Exigences particulières pour les électrovannes hydrauliques,
y compris les exigences mécaniques**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

AUTOMATIC ELECTRICAL CONTROLS –**Part 2-8: Particular requirements for electrically operated water valves,
including mechanical requirements**

FOREWORD

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 60730-2-8 edition 3.1 contains the third edition (2018-08) [documents 72/1077/CDV and 72/1120/RVC] and its amendment 1 (2021-10) [documents 72/1257/CDV and 72/1280/RVC].

This Final version does not show where the technical content is modified by amendment 1. A separate Redline version with all changes highlighted is available in this publication.

International Standard IEC 60730-2-8 has been prepared by IEC technical committee 72: Automatic electrical controls.

This third edition constitutes a technical revision.

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

- alignment of the text with IEC 60730-1 fifth edition (2013) including Amendment 1:2015;
- introduction of specific requirements for thermoplastic bodied valves for the control of water for tap and shower outlets (18.101.4.3 and Annex CC);
- removal of Subclause 18.102 Wetted material specifications.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

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

This Part 2-8 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) including its Amendment 1 (2015) and Amendment 2 (2020). Consideration may be given to future editions of, or amendments to, IEC 60730-1.

This Part 2-8 supplements or modifies the corresponding clauses in IEC 60730-1 so as to convert that publication into the IEC standard: *Safety requirements for electrically operated water valves, including mechanical requirements*.

Where this part 2-8 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, part 2-8 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 elements:

- Table 1, footnotes ab and ac
- Table 13, footnote aa
- 1.1.4
- 16.2.1
- 18.101.3
- 27.2.3.1
- 27.101
- Table DD. 1, footnote a
- Table DD.2, footnote a

In this publication:

- 1) The following print types are used:
 - Requirements proper: in roman type.
 - *Test specifications: in italic type.*
 - Notes: in smaller roman type.
 - Defined terms: in **bold type**

- 2) Subclauses, notes, tables or figures 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 the base publication and its amendment will remain unchanged until the stability date indicated on the IEC web site under 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.

AUTOMATIC ELECTRICAL CONTROLS –

Part 2-8: Particular requirements for electrically operated water valves, including mechanical requirements

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 electrically operated water valves for use in, on or in association with equipment for household and similar use, including heating, air-conditioning and similar applications. The equipment can use electricity, gas, oil, solid fuel, solar thermal energy, etc., or a combination thereof.

NOTE 1 Throughout this document, the word "equipment" means "appliances and equipment."

This document is applicable to electrically operated water valves for building automation within the scope of ISO 16484.

This document also applies to automatic electrically operated water valves for equipment that can be used by the public, such as equipment intended to be used in shops, offices, hospitals, farms and commercial and industrial applications.

EXAMPLE 1: Electrically operated water valves for commercial catering, heating and air-conditioning equipment.

This document does not apply to electrically operated water valves intended exclusively for industrial process applications unless explicitly mentioned in the relevant equipment standard.

This document applies to electrically operated water valves powered by primary or secondary batteries, requirements for which are contained within the standard, including Annex V.

This document does not cover the prevention of contamination of drinking water as a result of contact with materials.

1.1.1 This document 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 control devices used in, on or in association with, household and similar equipment.

This document contains requirements for electrical features of water valves and requirements for mechanical features of valves that affect their intended operation.

This document is also applicable to electrically operated water valves for appliances within the scope of the IEC 60335 series of standards.

This document does not apply to:

- electrically operated water valves of nominal connection size above DN 50;
- electrically operated water valves for admissible nominal pressure rating above 1.6 MPa;

- food dispensers;
- detergent dispensers;
- steam valves;
- electrically operated water valves designed exclusively for industrial applications.

Throughout this document, where it can be used unambiguously, the term:

- "valve" is used to denote an electrically operated water valve (including actuator and valve body assembly);
- "actuator" means "electrically operated mechanism or prime mover";
- "valve body" means "valve body assembly";
- "equipment" includes "appliance" and "control system".

1.1.2 This document applies to electrically operated water valves, responsive to or controlling such characteristics as temperature, pressure, passage of time, humidity, light, electrostatic effects, flow, or liquid level, current, voltage, acceleration, or combinations thereof.

1.1.3 This document also applies to actuators and to valve bodies which are designed to be fitted to each other.

1.1.4 This document applies to individual valves, valves utilized as part of a system and valves mechanically integral with multi-functional controls having non-electrical outputs.

NOTE Attention is drawn to the fact that, in many countries, additional test requirements and by-laws have been established by the water authorities or companies.

1.1.5 This document applies to AC or DC powered electrically operated water valves with a rated voltage not exceeding 690 V AC or 600 V DC.

1.1.6 This document does not take into account the **response value** of an **automatic action** of a valve, if such a **response value** is dependent upon the method of mounting the valve 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 This document applies also to electrically operated water valves incorporating **electronic devices**, requirements for which are contained in Annex H.

1.1.8 This document applies also to electrically operated water valves using NTC or PTC **thermistors**, requirements for which are contained in Annex J.

1.1.9 This document applies to the electrical and **functional safety** of electrically operated water valves capable of receiving and responding to communications signals, including signals for power billing rate and demand response.

The signals can be transmitted to or received from external units being part of the valve (wired), or to and from external units which are not part of the valve (wireless) under test.

1.1.10 This document does not 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**.

1.2 Normative references

This clause of Part 1 is applicable except as follows:

Addition:

ISO 7-1:1994, *Pipe threads where pressure-tight joints are made on the threads – Part 1: Dimensions, tolerances and designation*

ISO 65:1981, *Carbon steel tubes suitable for screwing in accordance with ISO 7-1*

ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads – Part 1: Dimensions, tolerances and designation*

ISO 630-2:2011, *Structural steels – Part 2: Technical delivery conditions for structural steels for general purposes*

ISO 1179-1, *Connections for general use and fluid power – Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing – Part 1: Threaded ports*

ISO 4144, *Pipework – Stainless steel fittings threaded in accordance with ISO 7-1*

2 Terms and definitions

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

2.2 Definitions of types of control according to purpose

2.2.17 electrically operated valve

Addition:

Note 1 to entry: A semi-automatic valve that is opened manually and closes automatically or vice versa is also covered by this definition.

Additional definitions:

2.2.17.101 valve

device consisting of an actuator connected to a valve body assembly and used to stop or regulate the flow of fluid by the closure or partial closure of an orifice

2.2.17.102 water valve

valve intended to be connected to a water supply and to control water flow

2.2.17.103 heating-water valve

valve intended to control the water circulation in heating systems

2.2.17.104 actuator

electrically operated mechanism or prime mover used to effect the opening or closing action of a valve

Note 1 to entry: An actuator may be integral with the valve, fixed to the valve body assembly or delivered as a separate component.

Note 2 to entry: An actuator may also include the valve and closure member.

2.2.17.105

valve body assembly

assembly comprising the valve body, inlet and outlet end connections, the valve seat, closure member and stem or shaft

Note 1 to entry: In some cases, the stem and closure member may be part of the actuator.

2.2.17.106

valve body

part of the valve body assembly which is the main pressure boundary

Note 1 to entry: It provides the water flow passage-ways with end connections.

2.2.17.107

nominal size

numerical designation of size which is common to all components in a fluid-conducting system other than components designated by outside diameter or by thread size

Note 1 to entry: It may be designated by "DN" followed by a convenient round number, for reference purposes only.

Note 2 to entry: Some older international standards refer to nominal size as nominal diameter but, for the purpose of this document, the two terms are synonymous.

2.2.17.108

nominal pressure rating

numerical designation of pressure rating

Note 1 to entry: It may be designated by the letters "PN" (also referred to as the pressure number) followed by a convenient round number, for reference purposes only.

2.2.17.109

end connection

valve body configuration provided to make a pressure-tight joint to the fluid-conducting system

2.2.17.110

valve seat

surface of the orifice within the valve which makes full contact with the closure member

2.2.17.111

closure member

movable part of the valve which is positioned in the flow path to modify the rate of flow through the valve

Note 1 to entry: A closure member may be a plug, ball, disc, vane, gate, etc.

2.2.17.112

stem

component which connects the actuator to, and positions, the closure member

Note 1 to entry: For rotary valves, the word "shaft" should be used in place of "stem".

Note 2 to entry: In some controls, the stem may be part of the actuator.

2.2.17.113

fitting

any device such as a reducer, expander, elbow, or T-piece which is attached directly to an end-connection of the valve body assembly

2.3 Definitions relating to the function of controls

2.3.29

maximum working pressure

Modification:

Delete “maximum rated pressure”.

Additional definitions:

2.3.101

on-off valve

valve which is open or closed, without any intermediate positions

2.3.102

normally closed valve

valve which is closed when not electrically energized

2.3.103

normally open valve

valve which is open when not electrically energized

2.3.104

modulating valve

valve which has a variable flow rate between predetermined flow limits

2.3.105

diverting valve

valve with one or more inputs and outputs which may permit flow from any combination of inputs to outputs

2.3.106

closed position

position of the closure member when there is no water flow from the outlet side of the valve

2.3.107

travel

displacement of the closure member from the closed position

2.3.108

rated travel

displacement of the closure member from the closed position to the full open position

2.3.109

open position

position of the closure member when there is a flow of water from the outlet side of the valve

2.3.110

fully open position

position of the closure member so that the amount of water flowing through the valve is in accordance with the rated flow rate

2.3.111

flow rate

volume of water flowing through the valve in unit time

2.3.112**rated flow rate**

flow rate at the rated travel under standard reference conditions of temperature and pressure declared at a given pressure difference

2.3.113**flow factor**

factor specifying the amount of water which can pass through the valve at a specified pressure difference

Note 1 to entry: The flow factor may be referred to as flow coefficient.

Note 2 to entry: The relationship between the different flow factors in use is indicated in Annex AA.

2.3.114**maximum operating pressure differential**

declared maximum difference in pressure between inlet and outlet ports of the valve against which the actuator can operate the closure member

2.3.115**minimum operating pressure differential**

declared minimum pressure difference at which the valve opens or closes

2.3.116

Void

2.3.117**water hammer**

excessive transient pressure which can occur in some water supply systems as a result of closing a valve as intended

2.3.118**transient pressure**

short-time pressure surge exceeding the normal stable supply pressure in the closed condition of the valve

2.3.119**valve with anti-water-hammer characteristics**

valve that does not cause an excessive pressure drop when opening and no excessive transient pressure when closing if connected directly, without special precautions to water supply mains applications where water-hammer may occur

2.13 Miscellaneous definitions

Additional definitions:

2.13.101

Void

2.13.102

Void

2.13.103**water for tap and shower outlets**

water intended to supply a bath, shower, bidet, wash basin, kitchen sink, or other such taps that discharge in to a drainage system

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

4.1.2 Addition:

Unless otherwise specified in this document, water temperature for the tests shall be maintained at a temperature of $(20 \pm 5) ^\circ\text{C}$.

4.2 Samples required

4.2.1 Addition:

One sample is required for each test of Clause 27.

NOTE 101 By agreement between manufacturer and testing authority, one sample can be submitted to more than one test.

5 Rating

This clause of Part 1 is applicable.

6 Classification

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

6.3.12 – electrically operated valve;

Additional subclause:

6.3.12.101 – water valve;

6.5.2 According to degree of protection provided by enclosures against harmful ingress of water (see IEC 60529)

Replacement of the second Note as follows:

NOTE 2 Preferred degrees of protection provided by enclosures are: IP20, IP30, IP40, IP54, IP65.
Values differing from these preferred values are allowed.

6.7 According to ambient temperature limits of the switch head

Modification:

In 6.7.1 and 6.7.2, read "valve" for "control" and "actuator" for "switch head".

6.8 According to protection against electric shock

6.8.3 Replacement:

For an independently mounted valve or a valve integrated or incorporated in an assembly utilizing a non-electrical source:

6.10 Not applicable.

6.11 According to number of automatic cycles (A) of each automatic action

Addition:

Water valves shall be subjected to a minimum of 6 000 automatic cycles.

Additional subclauses:

6.101 According to type of end-connections

6.101.1 Valves provided with internally threaded end-connections with either:

- a) ISO 7-1 or NPT thread when pressure-tight joints are made on the thread, or
- b) ISO 228-1 thread when pressure-tight joints are not made on the thread, but via an additional sealing washer.

6.101.2 Valves provided with externally threaded end-connections for:

- a) compression fittings, or
- b) washered union connection, or
- c) cone seated union connection, or
- d) threaded pipe connections either according to ISO 7-1, ISO 228-1 or NPT thread.

6.101.3 Valves provided with flanged end-connections suitable for connection to flanges with or without adaptors.

6.101.4 Valves provided with end-connections with neck-end for soldered or welded connections.

6.101.5 Valves provided with end-connections with hose tails for use with flexible tubing.

6.102 According to features of electrically operated water valves

6.102.1 According to the size and capacity:

Size and capacity to be specified in dimension of inlet and outlet connections and flow factor.

6.102.2 According to the type of operation:

Direct or pilot controlled with or without minimum pressure differential limit.

6.102.3 According to function:

Description of function regarding the number of water connections and the valve position when de-energized.

6.102.4 According to material of wetted parts:

Includes the material identification of all internal parts in contact with water such as the body and the sealing material.

6.102.5 According to construction of the closure member:

The valve may be a direct operated or pilot valve controlled diaphragm or piston-operated poppet type or spool type closing member.

6.102.6 According to construction of the actuator:

Examples are: electromagnetic; electric motor; electrically heated wax or bi-metal controlled actuator with actuator stem in contact with or shielded from the water.

6.103 According to temperature, pressure and type of the water controlled

Valves for controlling:

6.103.1 Cold water supply with a maximum temperature of 25 °C;

6.103.2 Hot water supply with a maximum temperature of 90 °C;

6.103.3 Void

6.103.4 Void

6.103.5 Circulation heating water with a maximum temperature of between 50 °C and 120 °C;

6.103.6 Water with a maximum rated temperature other than indicated above;

6.103.7 Water flow in systems with a maximum pressure of 0,1 MPa;

6.103.8 Water flow in systems with a maximum pressure of 0,6 MPa;

6.103.9 Water flow in systems with a maximum pressure of 0,86 MPa;

6.103.10 Water flow in systems with a maximum pressure of 1,0 MPa;

6.103.11 Water flow in systems with a maximum pressure of 1,6 MPa;

6.103.12 Water flow in systems with a maximum system pressure other than indicated above.

6.104 According to nominal size and thread size of end connections

The nominal size and the thread size of end connections are given in Table 101.

Table 101 – Nominal size and thread size of end connections

Designation of thread (inch)	Nominal size
1/8	DN 6
1/4	DN 8
3/8	DN 10
1/2	DN 15
3/4	DN 20
1	DN 25
1 ¼	DN 32
1 ½	DN 40
2	DN 50

NOTE The designation "DN" followed by the appropriate convenient round number is normally only loosely related to manufacturing dimensions and corresponds for reference purposes only approximately to the internal diameter expressed in millimetres of the water system.

7 Information

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

Table 1 – Required information and methods of providing information

Modification:

Replace the following items by:

	Information	Clause or subclause	Method
7	The type of load controlled by each circuit (for valves with switching devices) ^b	6.2, 14, 17, 23.1.1	C
22	Temperature limits of the actuator, if $T_{\min}$ lower than 0 °C, or $T_{\max}$ other than 55 °C	6.7, 14.5, 14.7, 17.3	D
26	Not applicable		
28	Not applicable		
29	Type of disconnection or interruption provided by each circuit (for valves with switching devices)	6.9, 2.4	X
36 to 38	Not applicable		
39	Type 1 or type 2 action (for valves with switching devices) ^{aa}	6.4	D or E
40	Additional features of type 1 or type 2 actions (for valves with switching devices) ^{aa}	6.4.3, 11.4	D or E
41	Manufacturing deviation and condition of test appropriate to deviation (for valves with switching devices)	11.4.3, 15, 17.14, 2.11.1	X
42	Drift (for valves with switching devices)	11.4.3, 15, 2.11.2	X
43 to 44	Not applicable		
47	Not applicable		
49	Control pollution situation of actuator	6.5.3	D or E

Add the following additional items:

Information		Clause or subclause	Method
101	Power consumption in watts or in VA or current rating		C
102	Maximum operating pressure differential in MPa (or in bar)	2.3.114	D
103	Minimum operating pressure differential in MPa (or in bar)	2.3.115	D
104	Maximum working pressure in MPa (or in bar)	2.3.29, 6.103	D
105	Flow direction indicated by an arrow (on valve body)		C
106	Maximum water temperature in °C	6.103	D
107	Void		
108	For valves intended to be cleaned in normal use, the method of disassembling, cleaning, reassembling and maintenance	18.1.101	D
109	If valve is intended to be used in water supply installations where water hammer may occur	18.101.3	X
110	Material identification of wetted parts	6.102.4	X
111	Valve features	6.101, 6.102	D
112	Plastic valves intended to be hand-tightened	18.103.5	D
113	Valves incorporated in those household appliances covered by the IEC 60335 series where the loss of water supply or dry valve is considered as an abnormal use condition ^{ab}	14.5.107, 27.101	D
114	For valves identified under item 113, details of any limitation of operating time (duty cycle) ^{ac}	27.101.2	D
115	Water valve intended to be used in accordance with IEC 60335	18.101.3	D
116	If the valve is intended to be used for the control of water for tap and shower outlets	2.13.103 18.101.4	D
^{aa} The water valve itself is type 1 action.			
^{ab} Not applicable in Canada, Japan and the USA.			
^{ac} Not applicable in Canada, Japan, and the USA.			

7.4 Additional requirements for marking

This clause of Part 1 is applicable except as follows:

7.4.4 Not applicable.

8 Protection against electric shock

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

8.1.4 Addition:

For class II water valves, reinforced insulation shall not be in direct contact with the water.

Additional subclause:

8.1.101 Valves which are declared capable of being cleaned in normal use shall be so constructed that there is adequate protection against accidental contact with live parts during cleaning.

Compliance is checked by inspection and by a simulated cleaning operation as described below.