

INTERNATIONAL STANDARD

This full version of IEC 60730-2-23:2025 includes the content of the references made to IEC 60730-1:2022

**Automatic electrical controls –
Part 2-23: Particular requirements for electrical sensors and sensing elements**

ITeH Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 60730-2-23:2025](https://standards.iteh.ai/catalog/standards/iec/e7e788f3-74c6-4354-9a11-5e621f68acee/iec-60730-2-23-2025)

<https://standards.iteh.ai/catalog/standards/iec/e7e788f3-74c6-4354-9a11-5e621f68acee/iec-60730-2-23-2025>



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2025 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 Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
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 corrigendum or an amendment might have been published.

IEC publications search -

webstore.iec.ch/advsearchform

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 It also gives information on projects, replaced and withdrawn publications.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 once a month by email.

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: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

[IEC 60730-2-23:2025](https://standards.iteh.ai/catalog/standards/iec/e7e788f3-74c6-4354-9a11-5e621f68acee/iec-60730-2-23-2025)

<https://standards.iteh.ai/catalog/standards/iec/e7e788f3-74c6-4354-9a11-5e621f68acee/iec-60730-2-23-2025>

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

CONTENTS

FOREWORD	9
1 Scope	11
2 Normative references	11
3 Terms and definitions	16
3.1 Definitions relating to ratings, voltages, currents, frequencies, and wattages	16
3.2 Definitions of types of control according to purpose	18
3.3 Definitions relating to the function of controls	22
3.4 Definitions relating to disconnection and interruption	24
3.5 Definitions of types of control according to construction	25
3.6 Definitions of type of automatic action of a control	26
3.7 Definitions relating to protection against electric shock and type of insulation	26
3.8 Definitions relating to component parts of controls	30
3.9 Definitions of types of terminals and terminations of controls	31
3.10 Definitions relating to the connections to controls	33
3.11 Definitions relating to the performance of type 2 actions	34
3.12 Definitions relating to the requirements for creepage distances and clearances	35
3.13 Miscellaneous definitions	35
3.14 Definitions relating to manufacturer and user	37
3.15 Definitions pertaining to thermistors	37
3.16 Definitions relating to the structure of controls using software	38
3.17 Definitions relating to error avoidance in controls using software	38
3.18 Definitions relating to fault/error control techniques for controls using software	38
3.19 Definitions relating to memory tests for controls using software	38
3.20 Definitions of software terminology – General	38
3.21 Definitions relating to classes of control functions	38
3.22 Definitions relating to functional safety	38
3.23 Definitions related to access to data exchange	38
3.24 Definitions related to EMC performance	38
3.101 Definitions relating to resistance temperature detector (RTD) sensors	41
4 General	41
4.1 General structure of the document	41
4.2 General requirements	42
4.3 General notes on tests	42
5 Required technical information	47
5.1 General requirements	47
5.2 Methods of providing technical information	48
5.3 Class II symbol	55
5.4 Additional requirements for marking	55
5.5 Warning or cautionary markings	57
6 Protection against electric shock	57
6.1 General requirements	57
6.2 Actuating members and actuating means	59
6.3 Capacitors	60
6.4 Covers and uninsulated live or hazardous parts	60

<https://nvd.nist.gov/vuln/detail/CVE-2025-2853> 10 Threaded parts and connections: e7e788f3-74c6-4354-9a11-5e621f68acee/iec-60730-853-2025

14	Moisture and dust resistance	106
14.1	Protection against ingress of water and dust	106
14.2	Protection against humid conditions	107
14.3	Touch current test for in-line cord controls and free-standing controls	108
15	Electric strength and insulation resistance	109
15.1	Insulation resistance	109
15.2	Electric strength	109
15.3	Additional tests for in-line cord and free-standing controls	111
16	Heating	112
17	Manufacturing deviation and drift	116
18	Environmental stress	116
19	Endurance	116
19.101	Conditioning tests for sensors	116
20	Mechanical strength	120
20.1	General requirements	120
20.2	Impact resistance	120
20.3	Free-standing controls	121
20.4	In-line cord controls	121
20.5	Pull-cord actuated controls	122
20.6	Foot actuated controls	122
20.7	Actuating member and actuating means	122
20.8	Flexing – test	122
20.9	Cord anchorages – test	123
20.101	Drop test	124
21	Resistance to heat, fire and tracking	124
21.1	General requirements	124
21.2	Integrated, incorporated and in-line cord controls	124
21.3	Independently mounted, free-standing controls	125
22	Resistance to corrosion	126
22.1	Resistance to rusting	126
23	Electromagnetic compatibility (EMC) requirements – Emission	126
23.1	General requirement	126
23.2	High frequency emission	126
23.3	Low frequency emission	130
24	Normal operation	130
25	Electromagnetic compatibility (EMC) requirements – Immunity	130
25.1	General	130
25.2	EMC test plan and report	131
25.3	Immunity requirements	132
25.4	Performance criteria	135
25.5	Surge immunity test	136
25.6	Electrical fast transient immunity test	136
25.7	Radio-frequency electromagnetic field immunity	137
25.8	Electrostatic discharge	137
25.9	Immunity to power-frequency magnetic fields	137
25.10	Test of the influence of voltage dips and voltage interruption in the power supply network	137
26	Abnormal operation tests	137

Annex A (normative) Indelibility of markings.....	156
Annex B (normative) Measurement of creepage distances and clearances in air.....	158
Annex C (informative) Nominal voltages of supply systems for different modes of overvoltage control	162
Annex D (normative) Overvoltage categories	164
Annex E (informative) Typical usage of controls and related overvoltage categories	165
Annex F (normative) Pollution degrees	166
Annex G (normative) Resistance to heat, fire and tracking tests	167
Annex H (normative) Requirements related to functional safety	169
Annex I (normative) Requirements for certain types of DC supplied controls	223
Annex J (normative) Requirements for thermistor elements and controls using thermistors.....	225
Annex K (normative) Circuit for measuring touch current	242
Annex L (normative) Printed circuit board coating performance test.....	243
Annex M (normative) Printed circuit board protection	245
Annex N (informative) Explanatory notes for surge immunity test.....	248
Annex O (informative) Guidance for applying Clause 11	252
Annex P (normative) Requirements for SELV and PELV	255
Annex Q (informative) Regional differences relevant for the member countries of Cenelec	258
Annex R (informative) National differences relevant in the United States of America.....	262
Annex S (informative) National differences relevant in Japan	263
Annex T (informative) National differences relevant in Canada	264
Bibliography.....	265

IEC 60730-2-23:2025

Figure 101 – Schematic diagram of a typical sensor	21
Figure 1 – Example of ports	39
Figure 2 – Structure of the document with respect to inherent safety and functional safety.....	42
Figure 3 – Example of an electronic circuit with low power points	101
Figure 4 – Test pin probe 13 of IEC 61032:1997	138
Figure 5 – Test finger probe B of IEC 61032:1997	139
Figure 6 – Test fingernail	140
Figure 7 – Impact test for free-standing controls	141
Figure 8 – Tumbling barrel.....	141
Figure 9 – Apparatus for testing durability of markings on rating labels	142
Figure 10 – Apparatus for flexing test	143
Figure 11 – Screw terminals and stud terminals	144
Figure 12 – Pillar terminals	145
Figure 13 – Mantle terminals.....	146
Figure 14 – Saddle and lug terminals	147
Figure 15 – Tabs.....	148
Figure 16 – Tabs for non-reversible connectors	149
Figure 17 – Receptacles	150

Figure 18 – Measurement of creepage distance and clearance	151
Figure 19 – Diagram for touch current measurement at operating temperature for single-phase connection of class II controls	152
Figure 20 – Diagram for touch current measurement at operating temperature for single-phase connection of controls other than class II	152
Figure 21 – Diagram for touch current measurement at operating temperature for three-phase connection of class II controls	153
Figure 22 – Diagram for touch current measurement at operating temperature for three-phase connection of controls other than class II	154
Figure 23 – Diagram for touch current measurement at operating temperature for single-phase connection of controls to three-wire, ground neutral supply other than class II	154
Figure 24 – Diagram for touch current measurement at operating temperature for two-phase connection of controls to three-wire, ground neutral supply other than class II	155
Figure B.1 – Narrow groove	159
Figure B.2 – Wide groove	159
Figure B.3 – V-shaped groove	159
Figure B.4 – Rib	159
Figure B.5 – Uncemented joint with narrow groove	160
Figure B.6 – Uncemented joint with wide groove	160
Figure B.7 – Uncemented joint with narrow and wide grooves	160
Figure B.8 – Diverging side walls	161
Figure B.9 – Narrow recess	161
Figure B.10 – Wide recess	161
Figure B.11 – Conductive floating part	161
Figure H.1 – V-Model for the software life cycle	189
Figure H.101 – Typical flammable vapor sensor test chamber (side view external wall)	208
Figure H.102 – Typical flammable vapor sensor test chamber (side view internal cutout)	208
Figure H.103 – Typical flammable vapor sensor test chamber (top view)	209
Figure H.2 – Voltage variation test	214
Figure J.1 – Generic test circuit for inrush-current limiting thermistor endurance test	241
Figure K.1 – Circuit for measuring touch currents	242
Figure L.1 – Test sample	244
Figure M.1 – Example of type 1 protection	246
Figure M.2 – Example of type 2 protection	247
Figure N.1 – Example of surge protection by shielding in buildings with common earth reference systems	250
Figure N.2 – Example of secondary surge protection in buildings with separate common earth reference systems	251
Figure N.3 – Example of primary and secondary surge protection of indoor/outdoor equipment	251
Figure O.1 – Guidance flowchart for application of requirements of Clause 11	253
Table 101 – Samples and test sequence for sensors	44
Table 102 – Electrical and thermal ratings of a sensor	46