

STN	Meranie a riadenie priemyselných procesov Programovateľné regulátory Časť 2: Požiadavky na zariadenia a skúšky	STN EN IEC 61131-2 18 7050
------------	---	--

Industrial-process measurement and control - Programmable controllers - Part 2: Equipment requirements and tests

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 03/26

Obsahuje: EN IEC 61131-2:2025, IEC 61131-2:2017

Oznámením tejto normy sa od 31.12.2030 ruší
STN EN 61131-2 (18 7050) z februára 2008

142111



EUROPEAN STANDARD

EN IEC 61131-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2025

ICS 25.040.40; 35.240.50

Supersedes EN 61131-2:2007

English Version

**Industrial-process measurement and control - Programmable
controllers - Part 2: Equipment requirements and tests
(IEC 61131-2:2017)**

Mesurage et contrôle des processus industriels - Automates
programmables - Partie 2: Exigences et essais des
équipements
(IEC 61131-2:2017)

Industrielle Leittechnik - Speicherprogrammierbare
Steuerungen - Teil 2: Betriebsmittelanforderungen und
Prüfungen
(IEC 61131-2:2017)

This European Standard was approved by CENELEC on 2025-10-30. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN IEC 61131-2:2025 (E)**European foreword**

The text of document 65B/1083/FDIS, future edition 4 of IEC 61131-2, prepared by SC 65B "Measurement and control devices" of IEC/TC 65 "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61131-2:2025.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2026-12-31 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2030-12-31 document have to be withdrawn

This document supersedes EN 61131-2:2007 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a standardization request addressed to CENELEC by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 61131-2:2017 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 60038	NOTE	Approved as EN 60038
IEC 60068-2-78	NOTE	Approved as EN IEC 60068-2-78
IEC 60721-3-0	NOTE	Approved as EN IEC 60721-3-0
IEC 60721-3-1	NOTE	Approved as EN IEC 60721-3-1
IEC 60721-3-2	NOTE	Approved as EN IEC 60721-3-2
IEC 60721-3-3	NOTE	Approved as EN IEC 60721-3-3
IEC 60721-3-7	NOTE	Approved as EN 60721-3-7
IEC 60947-5-2	NOTE	Approved as EN IEC 60947-5-2
IEC 60947-5-6	NOTE	Approved as EN 60947-5-6
IEC 61300-3-2	NOTE	Approved as EN 61300-3-2
IEC 61300-3-3	NOTE	Approved as EN 61300-3-3

EN IEC 61131-2:2025 (E)

IEC 61000-4-29 NOTE Approved as EN 61000-4-29
IEC 61010-1:2010 NOTE Approved as EN 61010-1:2010 (not modified)
CISPR 14-1 NOTE Approved as EN IEC 55014-1

EN IEC 61131-2:2025 (E)**Annex ZA**
(normative)**Normative references to international publications
with their corresponding European publications**

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cencenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068-2-1	-	Environmental testing - Part 2-1: Tests - Test A: Cold	EN 60068-2-1	-
IEC 60068-2-2	-	Environmental testing - Part 2-2: Tests - Test B: Dry heat	EN 60068-2-2	-
IEC 60068-2-6	-	Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6	-
IEC 60068-2-14	-	Environmental testing - Part 2-14: Tests - Test N: Change of temperature	EN IEC 60068-2-14	-
IEC 60068-2-27	-	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock	EN 60068-2-27	-
IEC 60068-2-30	-	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)	EN 60068-2-30	-
IEC 60068-2-31	-	Environmental testing - Part 2-31: Tests - Test Ec: Rough handling shocks, primarily for equipment-type specimens	EN 60068-2-31	-
IEC 60417	1973	Graphical symbols for use on equipment. Index, survey and compilation of the single sheets.	-	-
IEC 60947-5-1	2016	Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices	EN 60947-5-1	2017
IEC 61000-4-2	2008	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	EN 61000-4-2	2009
IEC 61000-4-3	2006	Electromagnetic compatibility (EMC) - Part 4-3 : Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	EN 61000-4-3	2006

EN IEC 61131-2:2025 (E)

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61000-4-4	2012	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test	EN 61000-4-4	2012
IEC 61000-4-5	2014	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5	2014
IEC 61000-4-6	2013	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6	2014
IEC 61000-4-8	2009	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test	EN 61000-4-8	2010
IEC 61000-4-11	2004	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests	EN 61000-4-11	2004
IEC 61000-4-18	2006	Electromagnetic compatibility (EMC) - Part 4-18: Testing and measurement techniques - Damped oscillatory wave immunity test	EN 61000-4-18	2007
IEC 61000-6-1	2016	Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity standard for residential, commercial and light-industrial environments	EN IEC 61000-6-1	2019
IEC 61000-6-2	2016	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments	EN IEC 61000-6-2	2019
IEC 61000-6-4	-	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments	EN IEC 61000-6-4	-
IEC 61010-2-201	-	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 2-201: Particular requirements for control equipment	EN IEC 61010-2-201	-
IEC 61131-1	-	Programmable controllers - Part 1: General information	EN 61131-1	-
IEC 61131-3	-	Programmable controllers - Part 3: Programming languages	EN 61131-3	-
IEC 61131-9	-	Programmable controllers - Part 9: Single-drop digital communication interface for small sensors and actuators (SDCI)	EN IEC 61131-9	-
IEC/TR 61131-4	2004	Programmable controllers - Part 4: User guidelines	-	-
IEC 61158	series	Industrial communication networks - Fieldbus specifications	EN IEC 61158	series
IEC 61784	series	Industrial communication networks - Profiles	EN IEC 61784	series
ISO 7000	-	Graphical symbols for use on equipment - Registered symbols	-	-

EN IEC 61131-2:2025 (E)

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ANSI/ISA-50.00.01	1975 -	Compatibility of Analog Signals for Electronic Industrial Process Instruments (R2012)	-	-
HCF_SPEC-13	Rev 7.5	HART (Highway Addressable Remote Transducer) Communication Protocol Specification	-	-



IEC 61131-2

Edition 4.0 2017-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Industrial-process measurement and control – Programmable controllers –
Part 2: Equipment requirements and tests**

**Mesurage et contrôle des processus industriels – Automates programmables –
Partie 2: Exigences et essais des équipements**





THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2017 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.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
 3, rue de Varembe
 CH-1211 Geneva 20
 Switzerland

Tel.: +41 22 919 02 11
 Fax: +41 22 919 03 00
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 corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

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 also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

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: csc@iec.ch.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Catalogue IEC - webstore.iec.ch/catalogue

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - www.iec.ch/searchpub

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

65 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.



IEC 61131-2

Edition 4.0 2017-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Industrial-process measurement and control – Programmable controllers –
Part 2: Equipment requirements and tests**

**Mesurage et contrôle des processus industriels – Automates programmables –
Partie 2: Exigences et essais des équipements**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 25.040.40; 35.240.50

ISBN 978-2-8322-4580-4

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	7
INTRODUCTION.....	9
1 Scope.....	10
2 Normative references	12
3 Terms, definitions, abbreviated terms, acronyms, conventions and symbols	13
3.1 Terms and definitions.....	13
3.2 Abbreviated terms, acronyms, conventions and symbols.....	18
4 Compliance and type tests.....	19
4.1 Compliance with this standard	19
4.2 Type tests	20
4.2.1 General	20
4.2.2 Equipment to be tested (equipment under test/EUT).....	20
4.2.3 Special features for EMC tests	23
4.2.4 Withstand test conditions.....	23
4.2.5 Climatic tests.....	23
4.2.6 Functionality verification with temperature	23
4.2.7 Verification procedure.....	27
4.2.8 Requirements for test programmes and proper functioning verification procedures (PFVPs) to be provided by the manufacturer	28
4.2.9 EMC Performance criteria.....	28
4.2.10 General facility/laboratory conditions for tests	29
4.3 Test report.....	29
5 Normal service conditions and requirements.....	30
5.1 General.....	30
5.2 Operating conditions and requirements.....	30
5.2.1 Ambient temperature and relative humidity	30
5.2.2 Altitude	34
5.3 Mechanical operating conditions and requirements	35
5.3.1 General	35
5.3.2 Vibrations	35
5.3.3 Shock	36
5.3.4 Free falls (portable and hand-held equipment).....	36
5.4 Transport and storage conditions and requirements	37
5.4.1 General	37
5.4.2 Ambient temperature and relative humidity	37
5.4.3 Altitude	39
5.4.4 Free falls (in manufacturer's original packaging).....	39
6 Functional requirements	40
6.1 General.....	40
6.2 Power input ports.....	41
6.2.1 Requirements	41
6.2.2 Verification of power input ports (a.c. or d.c.).....	42
6.3 Memory power back-up.....	46
6.3.1 Requirements	46
6.3.2 Verification of memory power back-up requirements.....	46
6.4 Digital I/Os.....	48

6.4.1	General	48
6.4.2	Positive logic digital I/Os (sinking inputs / sourcing outputs)	48
6.4.3	Negative logic digital I/Os (sourcing inputs / sinking outputs)	48
6.4.4	Digital inputs (positive logic, current sinking)	49
6.4.5	Digital outputs for alternating currents (positive logic, current sourcing)	52
6.4.6	Digital outputs for direct current (current sourcing)	57
6.4.7	Requirements for discrete channel compatibility with IEC 61131-9 SDCI	61
6.4.8	Special digital I/O interfaces	61
6.5	Analog I/Os	61
6.5.1	General	61
6.5.2	Analog inputs	61
6.5.3	Analog outputs	61
6.5.4	Analog temperature inputs	62
6.5.5	Requirements for analog channel compatibility with HART® (Highway Addressable Remote Transducer)	62
6.5.6	Verification of analog I/Os	62
6.6	Communication interface requirements	64
6.6.1	General	64
6.6.2	Verification of communication interface requirements	64
6.7	Main processing unit(s) and memory(ies) requirements	64
6.7.1	General	64
6.7.2	Verification of processing unit requirements	64
6.8	Remote input/output station (RIOS) requirements	65
6.8.1	General	65
6.8.2	Verification of local and remote I/O stations	65
6.9	Peripherals (PADTs, TEs, HMIs) requirements	66
6.9.1	General	66
6.9.2	Verification of peripheral (PADTs, TEs, HMIs) requirements	67
6.10	Self-tests and diagnostics requirements	67
6.10.1	General	67
6.10.2	Verification of self-tests and diagnostics	67
6.11	Functional earth	68
6.12	Requirements for information on normal service and function	68
7	Electromagnetic compatibility (EMC) requirements	68
7.1	General	68
7.2	Emission requirements	70
7.3	EMC immunity requirements	71
7.3.1	Immunity levels	71
7.3.2	Voltage dips and interruptions power ports	77
7.4	Requirements for information on EMC installation	78
8	Marking requirements and information to be provided by the manufacturer	78
8.1	Verification	78
8.2	General marking requirements	78
8.2.1	Minimum marking requirement	78
8.2.2	Functional identifications	79
8.2.3	Functional earth terminals markings	79
8.2.4	Documentation markings	79
8.3	Information format and content	79
8.3.1	Information format	79

8.3.2	Information content.....	80
8.3.3	Information on compliance with this standard.....	80
8.3.4	Information on shipping and storage	80
8.3.5	Information on a.c. and d.c. power supply.....	80
8.3.6	Information on digital inputs (current sinking)	81
8.3.7	Information on digital outputs for alternating currents (current sourcing)	81
8.3.8	Information on digital outputs for direct current (current sourcing).....	82
8.3.9	Information on analog inputs.....	82
8.3.10	Information on analog outputs	84
8.3.11	Information on communication interfaces	86
8.3.12	Information on main processing unit(s) and memory(ies)	86
8.3.13	Information on remote input/output station (RIOS)	86
8.3.14	Information on peripherals (PADTs, TEs, HMIs).....	87
8.3.15	Information on self-tests and diagnostics	87
8.4	Information on EMC installation	88
8.5	Information on reliability.....	88
Annex A (informative)	Temperature derating for altitude	89
A.1	Standard atmosphere modelling.....	89
A.1.1	Ambient temperature	89
A.1.2	Aerostatics equation	89
A.1.3	Air density	90
A.1.4	Radiation	90
A.1.5	Derating ratio.....	91
A.1.6	Comparison with IEEE1613	91
Annex B (informative)	Digital input standard operating range equations.....	93
Annex C (normative)	Zone C – EMC immunity levels	94
Annex D (normative)	Legacy techniques that are out-dated and not recommended for new design	97
D.1	Background	97
D.2	Ambient temperature	97
D.3	Type 2 digital input	97
D.3.1	Definition	97
D.3.2	Background	97
D.4	Analog inputs.....	98
D.5	Analog outputs.....	99
D.6	CRT displays	99
Annex E (informative)	Application reasoning for a.c. and d.c. interruptions	101
Annex F (normative)	Digital I/O: Current-sourcing input and current-sinking output.....	102
F.1	Digital I/O (negative logic).....	102
F.2	Function and verification	104
Bibliography	105
Figure 1	– Equipment in the scope and not in the scope	11
Figure 2	– Example EUT configurations	21
Figure 3	– General temperature test environment	24
Figure 4	– Vented equipment	25
Figure 5	– Non-vented equipment	26

Figure 6 – Panel mounted equipment extending through the wall of a cabinet	27
Figure 7 – Typical interface/port diagram of a modular control equipment	41
Figure 8 – Gradual shut-down/start-up test	44
Figure 9 – Fast supply voltage variation test	45
Figure 10 – Slow supply voltage variation test	45
Figure 11 – Positive logic (sinking inputs / sourcing outputs)	48
Figure 12 – U-I operation regions of current-sinking inputs	49
Figure 13 – Input Type 3 Diagnostic.....	51
Figure 14 – Temporary overload waveform for digital a.c. outputs.....	53
Figure 15 – Temporary overload waveform for digital d.c. outputs.....	58
Figure 16 – EMC zones	69
Figure A.1 – A small atmosphere element.....	89
Figure E.1 – d.c. distribution to control equipment and faults	101
Figure F.1 – Negative logic (sourcing inputs / sinking outputs).....	102
Figure F.2 – Positive logic with faults.....	103
Figure F.3 – Negative logic with faults	104
Table 1 – Criteria to prove the performance of an EUT against EMC disturbances	29
Table 2 – General facility/laboratory conditions for tests	29
Table 3 – Operating environments, ambient temperature and relative humidity	30
Table 4 – Dry-heat withstand and immunity tests	31
Table 5 – Cold withstand and immunity tests	32
Table 6 – Change of temperature, withstand and immunity tests	33
Table 7 – Cyclic (12 + 12) damp-heat withstand test	34
Table 8 – Multiplication factors for equipment ambient temperature of operation at altitudes up to 5 000 m	35
Table 9 – Sinusoidal vibration conditions	35
Table 10 – Immunity vibration test	36
Table 11 – Immunity shock test.....	36
Table 12 – Free fall on concrete floor for portable and hand-held equipment	37
Table 13 – Storage environments, ambient temperature and relative humidity	38
Table 14 – Transportation environments, ambient temperature and humidity	38
Table 15 – Free fall on concrete floor in manufacturer’s original packaging.....	39
Table 16 – Rated values and operating ranges of incoming power supply	41
Table 17 – Voltage interruptions (functional requirements).....	42
Table 18 – Voltage ripple and frequency range immunity test.....	43
Table 19 – Gradual shut-down/start-up test	44
Table 20 – Supply voltage variation tests	44
Table 21 – Voltage interruptions immunity test (Functional tests).....	46
Table 22 – Back-up duration withstand test.....	47
Table 23 – Change of energy source test.....	47
Table 24 – Operating ranges for digital inputs (current sinking).....	50
Table 25 – Rated values and operating ranges for current sourcing digital a.c. outputs.....	52

Table 26 – Overload test circuit values	55
Table 27 – Endurance test circuit values.....	55
Table 28 – Overload and short-circuit tests for digital outputs	56
Table 29 – Rated values and operating ranges (d.c.) for current-sourcing digital d.c. outputs	57
Table 30 – Overload and short-circuit tests for digital outputs	60
Table 31 – Rated values and impedance limits for analog inputs	61
Table 32 – Rated values and impedance limits for analog outputs	61
Table 33 – Analog output overload immunity test	63
Table 34 – Insertion/withdrawal of removable units	66
Table 35 – EMC zones & protection considerations.....	70
Table 36 – Enclosure port tests, Zones A and B.....	71
Table 37 – Conducted immunity tests, Zone B	72
Table 38 – Conducted immunity tests, zone A.....	73
Table 39 – Electrostatic discharge immunity test.....	74
Table 40 – Radiated electromagnetic field immunity test.....	75
Table 41 – Power-frequency magnetic field immunity test	75
Table 42 – Fast transient burst immunity test.....	76
Table 43 – High-energy surge immunity test	76
Table 44 – Conducted r.f. immunity test.....	77
Table 45 – Voltage dips and interruptions (EMC requirements).....	77
Table 46 – Voltage dips and interruptions immunity test (EMC tests) ^f	78
Table 47 – Analog input static characteristics	83
Table 48 – Analog input dynamic characteristics.....	83
Table 49 – Analog input general characteristics	84
Table 50 – Analog input miscellaneous characteristics.....	84
Table 51 – Analog output static characteristics	84
Table 52 – Analog output dynamic characteristics.....	85
Table 53 – Analog output general characteristics	85
Table 54 – Analog output miscellaneous characteristics	85
Table A.1 – Component temperature derating with altitude, 2 000 m as reference	91
Table A.2 – Component temperature derating with altitude, 1 500 m as reference, and 20 °C at the sea level standard temperature	91
Table C.1 – Enclosure port tests, Zone C.....	94
Table C.2 – Conducted immunity tests, Zone C.....	95
Table C.3 – Damped oscillatory wave immunity test.....	96
Table D.1 – Standard operating ranges for Type 2 digital inputs (current sinking)	98
Table D.2 – Rated values and impedance limits for analog inputs	99
Table D.3 – Rated values and impedance limits for analog outputs	99

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INDUSTRIAL-PROCESS MEASUREMENT AND CONTROL – PROGRAMMABLE CONTROLLERS –

Part 2: Equipment requirements and tests

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61131-2 has been prepared by subcommittee 65B: Measurement and control devices, of IEC technical committee 65: Industrial-process measurement, control and automation.

This fourth edition cancels and replaces the third edition published in 2007. This edition constitutes a technical revision.

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

- a) removal of safety requirements and instead pointing to IEC 61010-2-201;
- b) addition of negative logic digital inputs and outputs;
- c) addition of Type 3-d digital input;
- d) addition of 2,7 GHz to 6 GHz requirement for Radio-frequency electro-magnetic amplitude modulated immunity;

- e) clarification of temperature testing;
- f) clarification of type testing;
- g) deprecation of certain technologies;
- h) general update of multiple aspects of functionality and EMC;
- i) reorganization of clauses to associate requirements and verifications more closely.

The text of this standard is based on the following documents:

FDIS	Report on voting
65B/1083/FDIS	65B/1091/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.

A list of all parts in the IEC 61131 series, published under the general title *Industrial-process measurement and control – Programmable controllers*, can be found on the IEC website.

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.

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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

IEC 61131-2 is part of a series of standards on industrial control equipment, including programmable controllers, and their associated peripherals and should be read in conjunction with the other parts of the series. However, it can be read and applied alone.

Where a conflict exists between this and other IEC standards, the provisions of this standard should be considered to govern in the area of industrial control equipment, including programmable controllers, and their associated peripherals.

This standard defines for industrial control equipment the following:

- Testing and verifications methods (Clause 4);
- Operating conditions (5.2);
- Temperature and climatic tests (5.2.1);
- Mechanical requirements and tests (5.3);
- Functional requirements and tests for power supplies, I/Os and other components (Clause 6);
- EMC requirements and tests (Clause 7);
- Marking and documentation requirements (Clause 8).

Product safety requirements for PLC and the other types of industrial control equipment now in the scope of this standard are specified in IEC 61010-2-201, which replaces the requirements of Clauses 11 to 14 of IEC 61131-2:2007.

The operating conditions and the temperature derating for altitudes are aligned with IEC 61010-2-201:–1.

¹ Under preparation. Stage at the time of publication: IEC /CDV 61010-2-201:2016.

INDUSTRIAL-PROCESS MEASUREMENT AND CONTROL – PROGRAMMABLE CONTROLLERS –

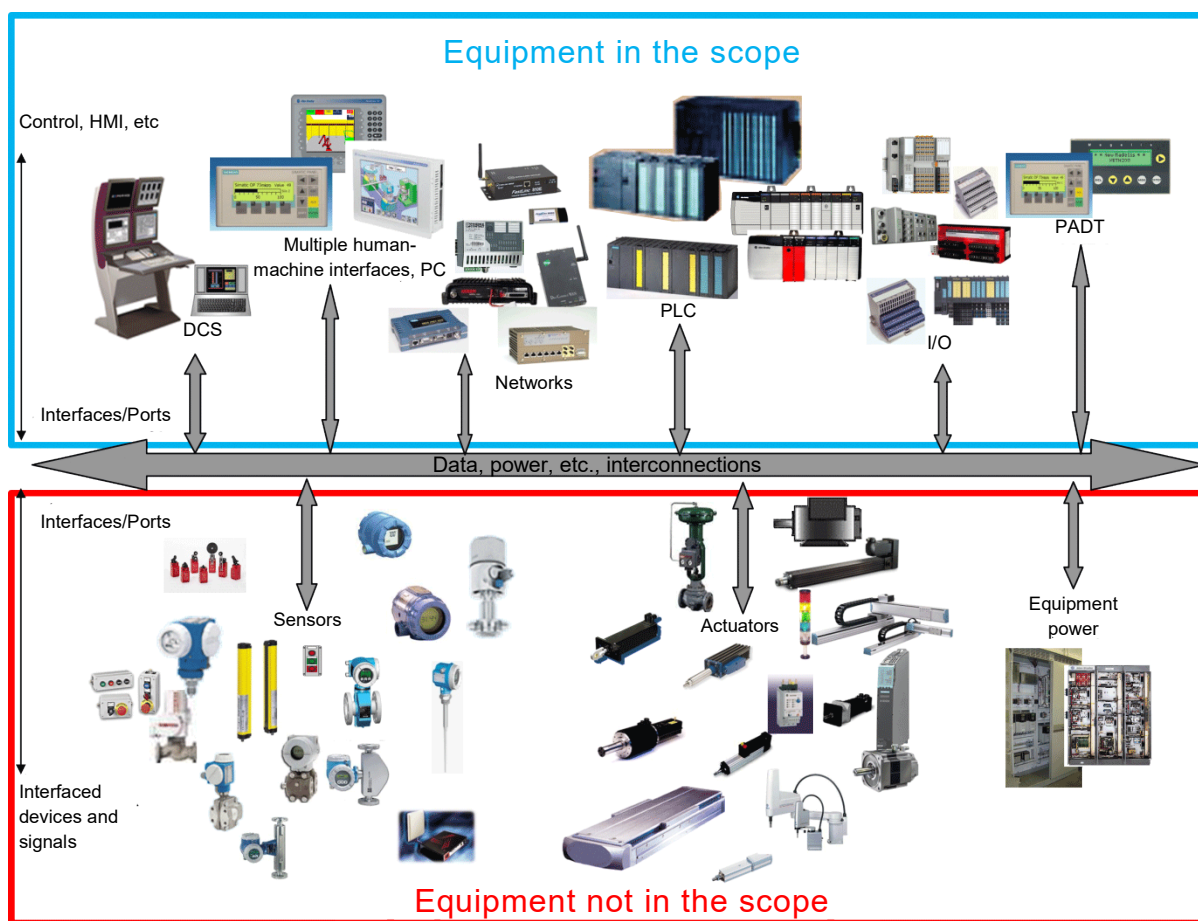
Part 2: Equipment requirements and tests

1 Scope

This part of IEC 61131 specifies functional and electromagnetic compatibility requirements and related verification tests for industrial control equipment of the following types:

- programmable controllers (PLC);
- programmable automation controller (PAC);
- remote I/O;
- programming and debugging tools (PADTs);
- industrial PC (computers) and industrial panel PC;
- displays and human-machine Interfaces (HMI) for industrial use;
- distributed control system (DCS), and DCS components that are listed here in the scope;
- any product where the primary purpose is performing the function of industrial control equipment, including PLC and/or PAC, and/or their associated peripherals which have as their intended use the control and command of machines, automated manufacturing and industrial processes, e.g. discrete, batch and continuous control.

In this document “control equipment” is equivalent to “industrial control equipment” as are PLC and PAC.



IEC

Figure 1 – Equipment in the scope and not in the scope

Components of the above named equipment (see Figure 1) included in the scope of this standard are:

- (auxiliary) stand-alone power supplies;
- peripherals such as digital and analog I/O;
- industrial network equipment.

Control equipment and their associated peripherals are intended to be used in an industrial environment and may be provided as open or enclosed equipment.

If control equipment or its associated peripherals are intended for use in other environments (light industrial, commercial, residential), then the specific requirements, standards and installation practices for those other environments shall be additionally applied to the control equipment and its associated peripherals.

Equipment covered in this standard is intended for use in overvoltage category II (IEC 60664-1) in low-voltage installations, where the rated equipment supply voltage does not exceed AC 1 000 V r.m.s. (50/60 Hz), or DC 1 000 V. If control equipment or their associated peripherals are applied in overvoltage category III installations, then additional analysis will be required to determine the suitability of the equipment for those applications.

The object of this standard is to establish the definitions and identify the principal characteristics relevant to the selection and application of control equipment and their associated peripherals.

This standard also specifies:

- a) service (operating, storage and transportation) requirements for control equipment and their associated peripherals (Clause 5);
- b) functional requirements for control equipment and their associated peripherals (Clause 6);
- c) EMC requirements for control equipment and their associated peripherals (Clause 7);
- d) information that the manufacturer is required to supply (Clause 8).

Safety requirements for control equipment and their associated peripherals are specified in IEC 61010-2-201.

The requirements of IEC Guide 106, "Guide for specifying environmental conditions for equipment performance rating", and IEC Guide 107 "Electromagnetic compatibility – Guide to the drafting of electromagnetic compatibility publications," are incorporated herein.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068-2-1, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-27, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-30, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 + 12 h cycle)*

IEC 60068-2-31, *Environmental testing – Part 2-31: Tests – Test Ec: Rough handling shocks, primarily for equipment-type specimens*

IEC 60417, *Graphical symbols for use on equipment* (available at <http://www.graphical-symbols.info/equipment>)

IEC 60947-5-1:2016, *Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices*

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3 : Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6:2013, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances induced by radio-frequency fields*

IEC 61000-4-8:2009, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

IEC 61000-4-11:2004, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

IEC 61000-4-18:2006, *Electromagnetic compatibility (EMC) – Part 4-18: Testing and measurement techniques – Damped oscillatory waves immunity test*

IEC 61000-6-1:2016, *Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity standard for residential, commercial and light-industrial environments*

IEC 61000-6-2:2016, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments*

IEC 61000-6-4, *Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments*

IEC 61010-2-201:–2, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 2-201: Particular requirements for control equipment*

IEC 61131-1, *Programmable controllers – Part 1: General information*

IEC 61131-3, *Programmable controllers – Part 3: Programming languages*

IEC 61131-9, *Programmable controllers – Part 9: Single-drop digital communication interface for small sensors and actuators (SDCI)*

IEC TR 61131-4, *Programmable controllers – Part 4: User guidelines*

IEC 61158 (all parts), *Industrial communication networks – Fieldbus specifications*

IEC 61784 (all parts), *Industrial communication networks – Profiles*

ISO 7000, *Graphical symbols for use on equipment – Registered symbols* (available at <http://www.iso.org/obp>)

ANSI/ISA-50.00.01-1975 – (R2012), *Compatibility of Analog Signals for Electronic Industrial Process Instruments*

HCF_SPEC-13, *HART (Highway Addressable Remote Transducer) Communication Protocol Specification, Rev 7.5*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN