IEC 60947-5-7

Edition 2.0 2024-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Low- voltage switchgear and controlgear – Part 5-7: Control circuit devices and switching elements – Proximity devices with analogue output

Appareillage à basse tension – Partie 5-7 : Appareils et éléments de commutation pour circuits de commande – Détecteurs de proximité à sortie analogique



IEC 60947-5-7:2024-04(en-fr)



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2024 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 Secretariat
3, rue de Varembé
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 It also gives information on projects, replaced and withdrawn publications.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.

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.

Recherche de publications IEC - webstore.iec.ch/advsearchform
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 une fois par mois par email.

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

IEC Products & Services Portal - products.iec.ch
Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications, symboles graphiques et le glossaire. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org
Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 500 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 25 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

IEC 60947-5-7

Edition 2.0 2024-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Low- voltage switchgear and controlgear – Part 5-7: Control circuit devices and switching elements – Proximity devices with analogue output

Appareillage à basse tension – Partie 5-7 : Appareils et éléments de commutation pour circuits de commande – Détecteurs de proximité à sortie analogique

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 29.130.20

ISBN 978-2-8322-8582-4

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.

® Registered trademark of the International Electrotechnical Commission
Marque déposée de la Commission Electrotechnique Internationale

CONTENTS

FOREWORD 5
1 Scope 7
2 Normative references 8
3 Terms, definitions and list of abbreviated terms 8
3.1 Basic definitions 8
3.2 Operation of a proximity device 9
3.3 Output element characteristics 12
3.4 List of abbreviated terms 15
4 Classification 16
4.1 General 16
5 Analog characteristics 16
5.1 General 16
5.3 Rated and limiting values for the proximity device and output elements 16
5.3.1 Voltages 16
5.3.2 Currents 16
5.3.3 Load conditions 17
5.3.4 Linearity 17
6 Product information 17
6.1 Nature of information – Identification 17
6.1.1 Adding information 17
6.1.2 Specific information of 6.1.1 bc) Output characteristics 18
6.4 Environmental information 18
6.4.1 Environmentally conscious design process (ECD process) 18
6.4.2 Procedure to establish material declaration 18
7 Normal service, mounting and transport conditions 18
8 Constructional and performance requirements 19
8.1 General 19
8.1.1 Load conditions 19
8.1.18 Security aspects 19
8.1.19 Embedded software 19
8.2 Performance requirements 19
8.2.1 Acceptance criteria 19
8.5 Analog output limit values 19
8.5.1 General 19
8.5.2 Environmental test conditions 20
9 Tests 21
9.1 General 21
9.3.1 Test sequences 21
9.6 Verification of the electromagnetic compatibility 22
9.6.1 General 22
9.8 Additional requirements for proximity switches with analog output 22
9.8.1 Requirements for test programs and proper functioning verification procedures (PFVPs) 22
9.8.2 Verification of analog output 23
9.8.3 Accuracy and related factors 24

9.9 Testing of detection capabilities of physical sizes like operating distance, speed, rotation speed, frequency, etc. 25
9.9.1 General 25
Annex A (informative) Example of the determination of the conformity 27
A.1 Example 1 of the determination of the conformity of an angle sensor, with linear output characteristics 27
A.2 Example 2 of the determination of the conformity of a position sensor, with nonlinear output characteristics 30
A.3 Test report and technical documentation 32
A.3.1 Test report 32
A.3.2 Technical documentation 32
A.3.3 Total probable error TPE 32
Annex B (informative) Overview tests and influence quantities 34
B.1 Tests at the standard reference conditions 34
B.2 Tests at ambient and process reference conditions for influence quantities 36
Annex C (normative) Additional requirements for proximity switches with analog output incorporating a built-in communication interface complying with IEC 61131-9 37
C.1 General 37
C.5 Analog Characteristics 37
C.5.1 Rated and limiting values for SDCI 37
C.6 Product information 37
C.8 Constructional and performance requirements 37
C.8.1 Constructional requirements 37
C.8.2 Electromagnetic compatibility (EMC) 37
C.9 Tests 38
C.9.1 Kinds of tests 38
Annex D (informative) Main characteristics for proximity devices with analog output 39
D.1 Properties of proximity devices with analog output 39
D.2 Library of product properties and value lists 41
D.2.1 Library of properties used in the device classes 41
D.2.2 Value lists of properties 44
Bibliography 46

Figure 1 – Proximity device with analog output (PDAO), schematic block diagram structure 7
Figure 2 – Principle diagram of time values and their meanings 14
Figure 3 – Principle diagram of limit values and their ranges 15
Figure 4 – limit values of analog output signals 20
Figure A.1 – Output values diagram corresponding to example of Table A.1 28
Figure A.2 – Error curves corresponding to example of Table A.1 29
Figure A.3 – Non-linearity error curves corresponding to the example of Table A.1 30
Figure A.4 – Output values diagram corresponding to example of Table A.2 31
Figure A.5 – Error curves corresponding to example of Table A.2 32

Table 1 – Range of analog voltage signals 16
Table 2 – Range of analog current signals 17
Table 3 – Load conditions 17

Table 4 – Analog output signal static characteristics 18
Table 5 – Analog output dynamic characteristics 18
Table 6 – Analog output overload immunity test 24
Table 7 – Number of measurement cycles and number and position of test points 24
Table A.1 – Example table for the errors of a linear sensor 27
Table A.2 – Example table for the errors of a nonlinear sensor 31
Table B.1 – Summary of the tests at the reference conditions 34
Table B.2 – Summary of tests for influence quantities at the operating conditions 36
Table D.1 – proximity sensing devices with analog output 39
Table D.2 – Library of properties used in the device classes 41
Table D.3 – Value lists of properties 44

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 5-7: Control circuit devices and switching elements – Proximity devices with analog output

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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60947-5-7 has been prepared by subcommittee 121A: Low-voltage switchgear and controlgear, of IEC technical committee 121: Switchgear and controlgear and their assemblies for low voltage. It is an International Standard.

This second edition cancels and replaces the first edition published in 2003. This edition constitutes a technical revision.

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

a) New structure;
b) Update and expansion of definitions on analog output properties;
c) Expanded performance requirements on analog output;

d) Update and new normative references;

e) Update of EMC requirements;

f) Harmonization with IEC 62828 series;

g) Harmonization with IEC 62683 and IEC 61987 definitions;

h) Harmonization with IEC 61131-2 requirements;

i) Update of the Annex A (former Annex G), Example of the determination of the conformity;

j) New Annex B, Overview tests and influence quantities;

k) New Annex C, Additional requirements for proximity switches with analog output incorporating a built-in communication interface complying with IEC 61131-9;

l) New Annex D, Main characteristics for proximity devices with analog output.

This International Standard is to be read in conjunction with IEC 60947-5-2:2019.

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

Draft	Report on voting
121A/592/FDIS	121A/604/RVD

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

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

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

A list of all the parts in the IEC 60947 series, under the general title *Low-voltage switchgear and controlgear*, 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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document 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.

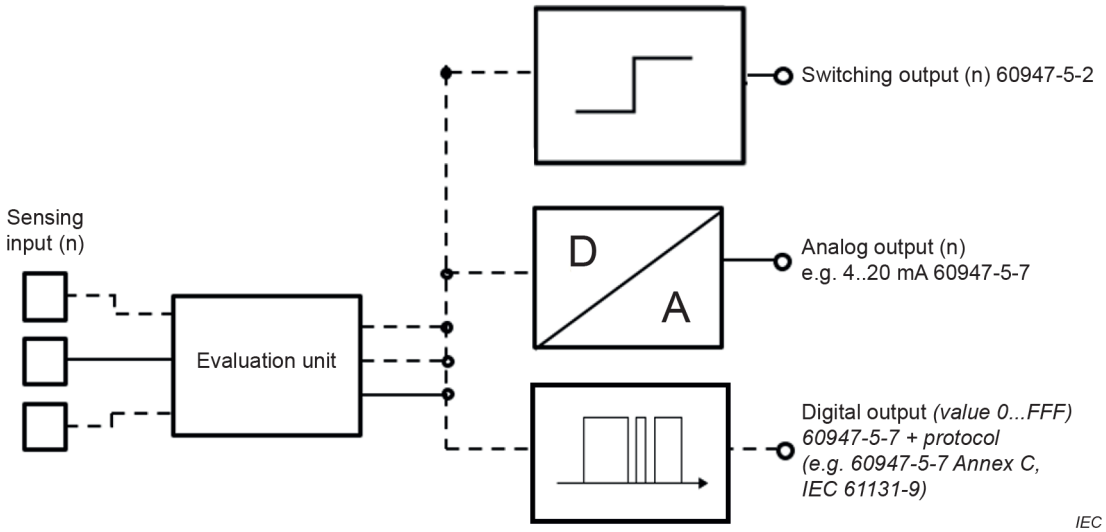
LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 5-7: Control circuit devices and switching elements – Proximity devices with analog output

1 Scope

This part of IEC 60947 states the requirements for proximity devices that correspond to the scope of IEC 60947-5-2:2019 with analog output (PDAO) and/or a digital output to transmit a corresponding digital value representing the detected sensing input. These devices can provide additional parameters. Figure 1 shows the schematic principle of such a device. They might consist of one or more parts.

The requirements of IEC 60947-5-2, *Low-voltage switchgear and controlgear – Part 5-2: Control circuit devices and switching elements – Proximity switches,* apply with the additions and modifications as stated in this document. The clause numbering in this document follows the clause numbering of IEC 60947-5-2, modified where necessary.



Key

evaluation unit Evaluating electronic circuitry, e.g. MCU, ASIC component...

Figure 1 – Proximity device with analog output (PDAO), schematic block diagram structure

This document does not apply to industrial process measurement transmitters according to IEC 62828 series.

Examples of typical applications for in-scope products:

- factory automation and machinery industry;
- logistic and packaging industry;
- conveyor belts, lifts;
- process industry;
- power plants.

Special applications (e.g. corrosive atmosphere) can cause additional requirements.

Products covered by the scope of this document are expected to be selected, installed, and maintained by skilled personnel only.

NOTE 1 Analog proximity devices can be linear or non linear.

NOTE 2 The specific requirements, characteristics, and test procedures for an analog output interface which are described in Clauses 5, 6 and 9 of this document, are based on requirements written in IEC 61131-2:2017.

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 60947-5-2:2019, *Low-voltage switchgear and controlgear – Part 5-2: Control circuit devices and switching elements – Proximity switches*

IEC 61131-9:2022, *Programmable controllers – Part 9: Single-drop digital communication interface for small sensors and actuators (SDCI)*

IEC 62443 (all parts), *Industrial communication networks – Network and system security*

IEC TS 63208:2020, *Low-voltage switchgear and controlgear – Security aspects*

3 Terms, definitions and list of abbreviated terms

For the purposes of this document, the terms and definitions given in IEC 60947-5-2:2019 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1 Basic definitions

3.1.1
proximity device with analog output
PDAO
device producing an output signal which varies continuously depending on the physical quantity (e.g. distance, speed, rotation, etc.) detected/calculated by the proximity device in relation to its target object(s)

3.1.2
lower range value
minimum stated input value above which the output signal varies continuously

3.1.3
upper range value
maximum stated input value below which the output signal varies continuously

3.1.4
range of input values
range defined by lower range value and upper range values of the sensing element detection capability, or calculated value (e.g. distance, speed, r/min, etc.), within which the limits of uncertainty of the proximity device are specified

Note 1 to entry: A principle diagram describing the terms of 3.1.2 to 3.1.4 is given in Figure 3.

3.1.5
span
range of input values
algebraic difference between the values of the upper and lower limits of the measuring range

Note 1 to entry: Upper and lower limits do not reflect the sensing capabilities of the device, but the relevant upper and lower values for the application.

Note 2 to entry: The CDD code of this entry for Electronic Data Exchange is ABB785, modified ("other variables" removed).

[SOURCE: IEC 60050-311:2001, 311-03-13, modified — Notes to entry added]

3.2 Operation of a proximity device

3.2.1
linearity
ability of a proximity device to provide an indication having a linear relationship with a defined quantity other than an influence quantity

Note 1 to entry: The method of expression of lack of linearity is different for different kinds of device and is established in each particular instance.

[SOURCE: IEC 60050-311:2001, 311-06-05, modified – "measuring instrument" replaced by "proximity device"]

3.2.2
conformity of the output signal curve
ability of a proximity device to provide an indication having a specified characteristic curve which can be linear, logarithmic, parabolic, etc.

3.2.3
non-linearity
deviation from ideal behaviour for devices that have a linear input/output relationship, determined from the curve plotted using the overall average of corresponding upscale and downscale errors

Note 1 to entry: Non-linearity can be calculated and expressed in one of three ways: – independent: line positioned so as to minimize the maximum deviation; – terminal-based: line positioned so as to coincide with the actual characteristic curve at the upper and lower range-values; – zero-based: line positioned so as to coincide with the actual characteristic curve at the lower range-value.

Note 2 to entry: The corresponding properties can be found in the CDD.

Note 3 to entry: Linearity is defined in IEC 60050-300:2001, 311-06-06.

Note 4 to entry: Non-linearity does not include hysteresis.

Note 5 to entry: Conformity is often used in conjunction with non-linear curves.

[SOURCE: IEC 61987-13:2016, modified — Notes to entry added]

3.2.4
non-conformity of the output signal curve
deviation from ideal behaviour for devices that have a non-linear input/output relationship, determined from the curve plotted using the overall average of corresponding upscale and downscale errors

Note 1 to entry: The non-conformity is defined as the closeness with which an average error curve approximates to a specified characteristic curve (which can be linear, logarithmic, parabolic, etc.).

3.2.5
true value
<of a physical quantity value> value consistent with the definition of a given particular quantity

Note 1 to entry: This term is used in the "true value" approach.

Note 2 to entry: Value that would be obtained by a perfect measurement.

Note 3 to entry: True values are by nature indeterminate.

Note 4 to entry: The indefinite article "a", rather than the definite article "the", is used in conjunction with "true value" because there can be many values consistent with the definition of a given particular quantity.

[SOURCE: IEC 60050-311:2001, 311-01-04]

3.2.6
conventional true value
<of a physical quantity value> value attributed to a particular quantity and accepted, sometimes by convention, as having an uncertainty appropriate for a given purpose

Note 1 to entry: This term is used in the "uncertainty" approach.

Note 2 to entry: The "conventional true value" is sometimes called "assigned value", "best estimate of the value", "conventional value" or "reference value". The term "reference value", in this sense, should not be confused with "reference value" in the sense used in IEC 60050-311:2001, 311-07-01.

Note 3 to entry: Frequently, a large number of results of measurement of a quantity are used to establish a conventional true value.

Note 4 to entry: An alternative concept of measurement uncertainty used for measurement instruments is described in IEC Guide 115:2021, *Application of uncertainty of measurement to conformity assessment activities in the electrotechnical sector*.

3.2.7
inaccuracy
maximum positive and negative deviation from the specified characteristic curve observed in testing a device under specified conditions and by a specified procedure

Note 1 to entry: Accuracy is defined in IEC 60050-311:2001, 311-06-08.

[SOURCE: IEC 61298-1:2008, 3.5]

3.2.8
long term drift
drift in output monitored for 30 days at 90 % of span

[SOURCE: IEC 61987-1:2008, 3.22]

3.2.9
long term stability
drift of zero output signal in percent of full scale limit after a given period of normal operating conditions

Note 1 to entry: The long term stability can be evaluated over a different period of time, e.g. 6 months, 1, 2 or 5 years. Sometimes manufacturers declare a life-time stability.

Note 2 to entry: Depending the type of a proximity device, the drift can be referred to an upper range limit, a fixed value, a full scale, etc.

3.2.10
repeatability
value of variation of the output signal under specified conditions expressed as a percentage of the span

Note 1 to entry: This definition is more general and not equal to the definition in IEC 60947-5-2:2019.

3.2.11
resolution value
resolution of the value of the physical quantity

Note 1 to entry: The resolution value from the digital output value and the analog output value can be different.

3.2.12
error
discrepancy between a computed, observed or measured value or condition, and the true, specified or theoretically correct value or condition

Note 1 to entry: An error within a system may be caused by failure of one or more of its components, or by activation of a systematic fault.

[SOURCE: IEC 60050-192:2015, 192-03-02]

3.2.13
linearity error of the digital output
maximum deviation between the real and the ideal curve of the digital output

3.2.14
linearity error of the analog output
maximum deviation between the real and the ideal curve of the analog output

3.2.15
reference base for linearity error
basis for stating the linearity error for analog output

Note 1 to entry: The reference base can be output span, full scale or definition by the manufacturer.

3.2.16
upscale error
arithmetic mean of the errors at each value of each measurement cycle with increasing input value

3.2.17
downscale error
arithmetic mean of the errors at each value of each measurement cycle with decreasing input value

3.2.18
average error
arithmetic mean of all upscale and downscale readings at each value

3.2.19
maximum measured error
largest positive or negative value of errors of the average upscale or downscale values at each point of measurement

Note 1 to entry: Synonymous to measured error expressed as percentage ABB652 of IEC 61987.

[SOURCE: IEC 61298-1:2008]

3.2.20
total probable error
TPE
number obtained by taking the square root of the total sum of the squares of the individual error factors, adopted to consistently compare the performances of two (or more) devices

Note 1 to entry: It is assumed that the variables of the individual errors are independent of each other.

Note 2 to entry: When combining all the error factors, the units of measure shall all be the same.

3.3 Output element characteristics

3.3.1
analog current signal
current signal which varies in a continuous manner within its range

3.3.2
analog voltage signal
voltage signal which varies in a continuous manner within its range

3.3.3
range of an analog signal
all values of the signal between and including defined limits

3.3.4
output span
algebraic difference between the values of the upper and the lower limits of the output signal

3.3.5
lower limit output signal
specified minimum value of the range

Note 1 to entry: The lower limit may be either zero or a finite value; when zero is used, this is called "true zero"; when a finite value is used, this is called "live zero".

3.3.6
upper limit output signal
specified maximum value of the range

3.3.7
load impedance
<maximum load (current), minimum load (voltage)> impedance or impedances for which the output characteristics of the proximity device are specified

3.3.8
ripple content
ratio between the peak-to-peak value of the AC component and the upper limit of the signal value

3.3.9
recovery time
time taken, following the removal of an external influence, for the output signal to return to its previous value within the limits of repeatability as defined in 3.2.10

3.3.10
warm-up time
duration between the instant when the power supply is energized and the instant when the device can be used, as specified by the manufacturer

[SOURCE: IEC 61987 DB: Identifier IECABB026, see Figure 2]

3.3.11
settling time
time interval between the step change of an input signal and the instant when the resulting variation of the output of the signal does not deviate more than 1% from its final steady state value

[SOURCE: IEC 61987 DB: Identifier IECABA999, see Figure 2]

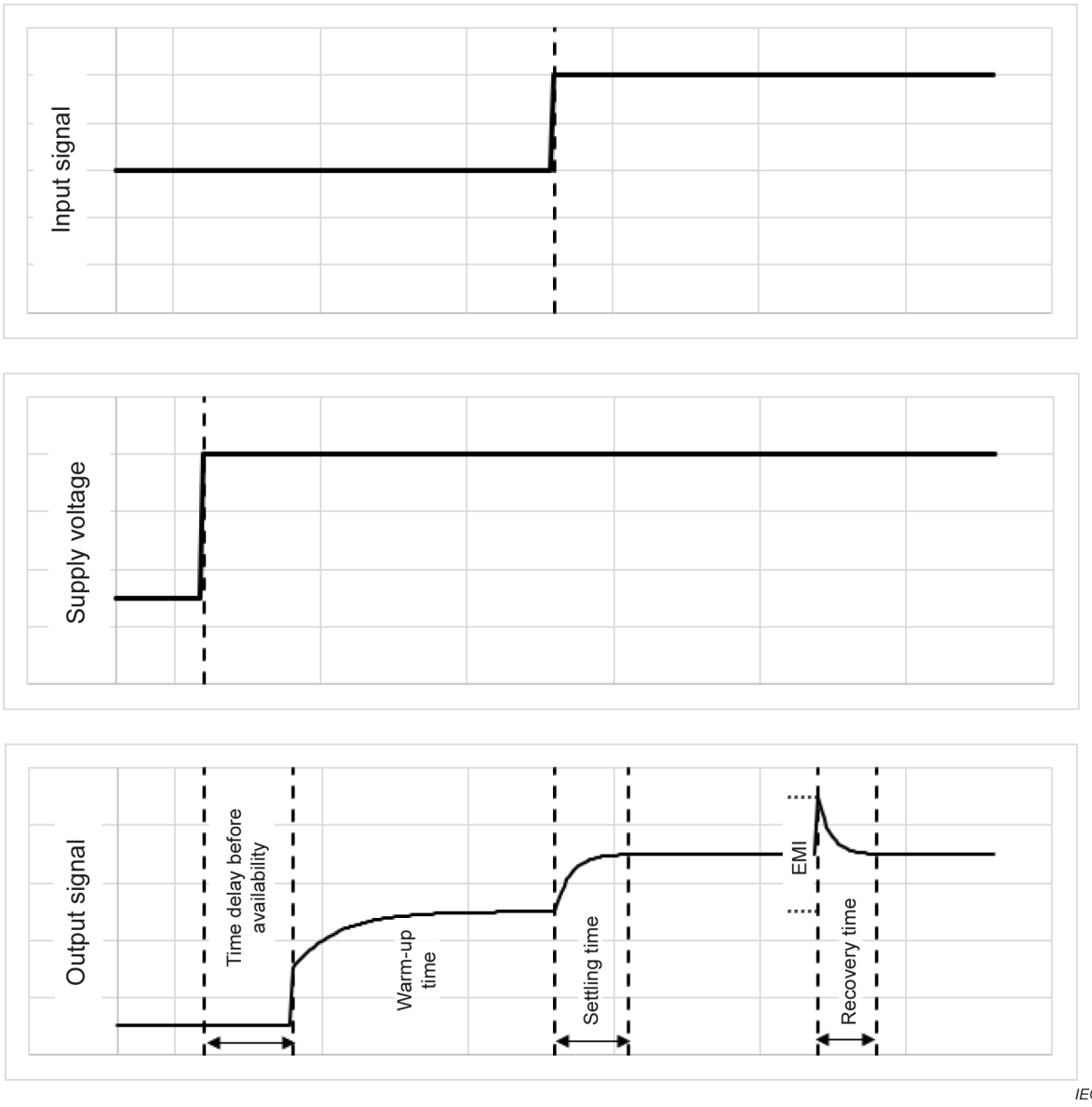
3.3.12
output signal
analog or digital representation of the physical quantity value produced by a transducer

Note 1 to entry: A transmitter is a transducer with standardized output, see IEC 60050-351:2013, 351-56-29.

[SOURCE: IEC 60050-314:2001, 314-04-06, modified – "measurand" replaced by "physical quantity value"]

3.3.13
transition region
part of the output range between the specified minimum (resp. maximum) value and the lower (resp. upper) signal characterizing a product failure

Note 1 to entry: A principle diagram is given in Figure 4a) and Figure 4b).



Key

t time

Figure 2 – Principle diagram of time values and their meanings

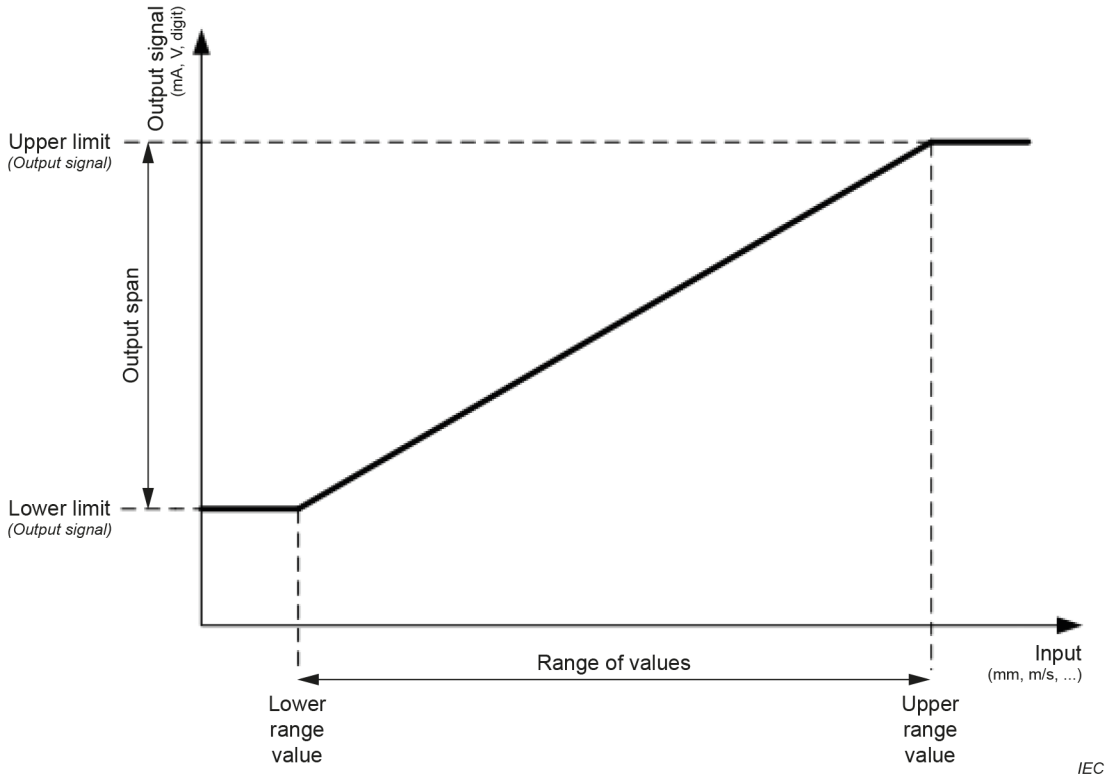


Figure 3 – Principle diagram of limit values and their ranges

3.3.14
single-drop digital communication interface (SDCI)
digital communication interface for switching 24 V devices (e.g. IO-Link™ [1]) defining a point-to point communication link for connecting sensors and actuators to a master unit

3.4 List of abbreviated terms

ASIC	Application specific integrated circuit
CDD	Common Data Dictionary
ECD	Environmentally conscious design process
EMC	Electromagnetic compatibility
EUT	Equipment under test
IOL	IO-link
LSB	Least significant bit
MCU	Microcontroller unit
PDAO	Proximity device with analog output
PFVP	Proper functioning verification procedures
SDCI	Single-drop digital communication interface
TPE	Total probable error

[1] IO-Link™ is a trade name of the "IO-Link Consortium". This information is given for the convenience of users of this publication and does not constitute an endorsement by IEC of the trade name holder or any of its products. Compliance to this publication does not require use of the registered logos for IO-Link™. Use of the registered logos for IO-Link™ requires permission of the "IO-Link Consortium".