SLOVENSKI STANDARD
oSIST prEN IEC 60688:2021

01-april-2021

Električni merilni pretvorniki za pretvarjanje izmeničnih in enosmernih električnih veličin v analogne ali digitalne signale

Electrical measuring transducers for converting AC and DC electrical quantities to analogue or digital signals

Transducteurs électriques de mesure convertissant les grandeurs électriques alternatives ou continues en signaux analogiques ou numériques

Ta slovenski standard je istoveten z: **prEN IEC 60688:2021**

ICS:

17.220.20	Merjenje električnih in magnetnih veličin	Measurement of electrical and magnetic quantities

oSIST prEN IEC 60688:2021 **en,fr,de**

85/748/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:

IEC 60688 ED4

DATE OF CIRCULATION:	CLOSING DATE FOR VOTING:
2021-01-29	**2021-04-23**

SUPERSEDES DOCUMENTS:

IEC TC 85 : MEASURING EQUIPMENT FOR ELECTRICAL AND ELECTROMAGNETIC QUANTITIES

SECRETARIAT:	SECRETARY:
China	Ms Guiju HAN
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 13,SC 23K,TC 38,TC 66	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY

☒ SUBMITTED FOR CENELEC PARALLEL VOTING ☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

Attention IEC-CENELEC parallel voting

The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.

The CENELEC members are invited to vote through the CENELEC online voting system.

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Electrical measuring transducers for converting AC and DC electrical quantities to analogue or digital signals

PROPOSED STABILITY DATE: 2023

NOTE FROM TC/SC OFFICERS:

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

ELECTRICAL MEASURING TRANSDUCERS FOR CONVERTING AC AND DC ELECTRICAL QUANTITIES TO ANALOGUE OR DIGITAL SIGNALS

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 60688 has been prepared by IEC technical committee 85: Measuring equipment for basic electrical quantities.

This fourth edition cancels and replaces the third edition published in 2012. It constitutes a technical revision

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

– updating normative references;
–
– additional requirements for specific transducers used for LV monitoring applications
– creation of interface coding to ease selection by the end-user

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

FDIS	Report on voting

85/XX/FDIS	85/XX/RVD

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

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

In this standard, the following print types are used:

– requirements and definitions: in roman type;

– NOTES: in smaller roman type;

– *compliance: in italic type.*

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://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.

The National Committees are requested to note that for this publication the stability date is 2023

THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED AT THE PUBLICATION STAGE.

INTRODUCTION

New transducers can now be equipped with microprocessors that utilise digital data processing, communication methods and auxiliary sensors. This makes them more complex than conventional analogue transducers and gives them considerable added value.

The class index system of classification used in this standard is based upon the IEC 60051 series: *Direct acting indicating analogue electrical measuring instruments and their accessories*. Under this system, the permitted variations of the output signal due to varying influence quantities – ambient temperature, voltage, frequency, etc., – are implicit in the classification.

For those unfamiliar with the class index system, a word of warning is necessary. If, for example, a transducer is classified as Class 1, it does not mean that the error under practical conditions of use will be within ±1 % of the actual value of the output or ±1 % of the full output value. It means that the error should not exceed ±1 % of the fiducial value under closely specified conditions. If the influence quantities are varied between the limits specified by the nominal ranges of use, a variation of amount comparable with the value of the class index may be incurred for each influence quantity.

The permissible error of a transducer under working conditions is the sum of the permissible intrinsic error and of the permissible variations due to each of the influence quantities. However, the actual error is likely to be much smaller because not all of the influence quantities are likely to be simultaneously at their most unfavourable values and some of the variations may cancel one another. It is important that these facts be taken into consideration when specifying transducers for a particular purpose.

Furthermore, some of the terms used in this standard are different from those used in IEC 60051 due to the fundamental differences between indicating instruments and measuring transducers.

All statements of performance are related to the output which is governed by two basic terms:

– "the nominal value", which may have a positive or a negative sign or both;

– "the span", which is the range of values of the output signal from maximum positive to maximum negative, if appropriate.

ELECTRICAL MEASURING TRANSDUCERS FOR CONVERTING AC AND DC ELECTRICAL QUANTITIES TO ANALOGUE OR DIGITAL SIGNALS

1 Scope

This International Standard applies to transducers with electrical inputs and outputs for making measurements of AC or DC electrical quantities. The output signal may be in the form of an analogue direct current, an analog direct voltage or in digital form. In this case, that part of the transducer utilized for communication purposes will need to be compatible with the external system.

This standard applies to measuring transducers used for converting following electrical quantities such as:

– current,
– voltage,
– active power,
– reactive power,
– power factor,
– phase angle,
– frequency,
– harmonics or total harmonic distortion,
– apparent power

to an output signal.

This standard is not applicable for:

– instrument transformers that complies with IEC 61869 series;
– transmitters for use in industrial process application that complies with IEC 60770 series.;
– performance measuring and monitoring devices (PMD) that comply with IEC 61557-12.

Within the measuring range, the output signal is a function of the measurand. An auxiliary supply may be needed.

This standard applies:

a) if the nominal frequency of the input(s) lies between 0 Hz and 1 500 Hz;
b) if a measuring transducer is part of a system for the measurement of a non-electrical quantity, this standard may be applied to the electrical measuring transducer, if it otherwise falls within the scope of this standard;
c) to transducers for use in a variety of applications such as telemetry and process control and in one of a number of defined environments.

This International Standard is intended:

– to specify the terminology and definitions relating to transducers whose main application is in industry;
– to unify the test methods used in evaluating transducer performance;
– to specify accuracy limits and output values for transducers.

2 Normative references

The following referenced documents are indispensable for the application 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 60051-1:1997, *Direct acting indicating analogue electrical measuring instruments and their accessories – Part 1: Definitions and general requirements common to all parts*

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

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

IEC 60255-151, *Measuring relays and protection equipment – Part 151: Functional requirements for over/under current protection*

IEC 61010 (all parts), *Safety requirements for electrical equipment for measurement, control and laboratory use*

IEC 61010-1:2010, *Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements*
IEC 61010-1:2010/AMD1:2016

IEC 61010-2-030:2017, Safety requirements for electrical equipment for measurement, control, and laboratory *use – Part 30 Special requirements for testing and measuring circuits*

IEC 61326-1:2020, *Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements*

IEC 61557-12, *Electrical safety in low voltage distribution systems up to 1 000 V* AC *and 1 500 V DC. – Equipment for testing, measuring or monitoring of protective measures – Part 12: Performance measuring and monitoring devices (PMD)*

3 Terms and definitions

For the purpose of this document the following terms and definitions apply:

3.1 General terms

3.1.1
(electrical measuring) transducer
TRD
device for converting an AC or DC measurand to a direct or alternative current, a direct or alternative voltage or a digital signal for measurement purposes

3.1.2
(electrical measuring) transducer type 1
TRD1
conventional transducer

NOTE – Transducers type 1 are using conventional interface outputs and are generally single-function devices

3.1.3
(electrical measuring) transducer type 2
TRD2
single-function transducer used in LV monitoring applications

NOTE – Transducers type 2 are using specific interface outputs and are generally more accurate

3.1.4
single-function device
device performing the measurement of a single electrical quantity (e.g. current, power factor, THD, …) in a single form (e.g. RMS or peak or average, …) but not both

3.1.5
analogue transducer
device for converting an AC or DC. measurand to a direct or alternative current, a direct or alternative voltage for measurement purposes

3.1.6
digital transducer
device for converting an AC or DC. measurand to a digital signal for measurement purposes

3.1.7
auxiliary supply
AC or DC electrical supply, other than the measurand, which is necessary for the correct operation of the transducer

3.1.8
auxiliary circuit
circuit which is usually energized by the auxiliary supply.

NOTE The auxiliary circuit is sometimes energized by one of the input quantities.

3.1.9
transducer with offset zero (live zero)
transducer that gives a predetermined output signal other than zero when the measurand is zero

3.1.10
transducer with suppressed zero
transducer for which zero output signal corresponds to a measurand greater than zero

3.1.11
total distortion factor
ratio of the r.m.s. value of the total distortion content to the the r.m.s. value of an alternating quantity

NOTE – The total distortion factor depends on the choice of the fundamental component. If it is not clear from the context which one is used an indication should be given.

3.1.12
output load (for analogue signals only)
total resistance of the circuits and apparatus connected externally across the output terminals of the transducer

3.1.13
ripple content (of an analogue output signal)
with steady-state input conditions, the ratio of the peak-to-peak value of the fluctuating component of an analogue output signal, expressed in percentage, to the fiducial value

3.1.14
output signal
an analogue or digital representation of the measurand

3.1.15
output power
power at the transducer output terminals

3.1.16
output current (voltage) (for analogue signals only)
current (voltage) produced by the transducer which is an analogue function of the measurand

3.1.17
reversible output current (voltage) (for analogue signals only)
output current (voltage) that reverses polarity in response to a change of sign or direction of the measurand

3.1.18
measuring element of a transducer
unit or module of a transducer that converts the measurand, or part of the measurand, into a corresponding signal

3.1.19
single element transducer
transducer having one measuring element

3.1.20
multi-element transducer
transducer having two or more measuring elements. The signals from the individual elements are combined to produce an output signal corresponding to the measurand

3.1.21
combined transducer
transducer having two or more measuring circuits for one or more functions

3.1.22
response time
time from the instant of application of a specified change of the measurand until the output signal reaches and remains at its final steady value or within a specified interval centred on this value

3.1.23
compliance voltage
accuracy limiting output voltage
For variable output load transducers having a current output, the value of the voltage appearing across the output terminals up to which the transducer complies with the requirements of this standard

3.1.24
(output) series mode interference voltage
unwanted alternating voltage appearing in series between the output terminals and the load

3.1.25
(output) common mode interference voltage
unwanted alternating voltage that exists between each of the output terminals and a reference point

3.1.26
storage conditions
conditions, defined by means of the ranges of the influence quantities, such as temperature or any other special condition, within which the transducer may be stored (non-operating) without damage

3.1.27
stability
ability of a transducer to keep its performance characteristics unchanged during a specified time, all influence quantities remaining within their specified ranges

3.1.28
short-term stability
stability over a period of 24 h

3.1.29
long-term stability
stability over a period of one year

3.1.30
usage group
group of transducers capable of operating under a specified set of environmental conditions