



SLOVENSKI STANDARD SIST EN IEC 63041-1:2022

01-januar-2022

Nadomešča:

SIST EN IEC 63041-1:2018

Piezelektrični senzorji - 1. del: Splošne specifikacije (IEC 63041-1:2021)

Piezoelectric sensors - Part 1: Generic specifications (IEC 63041-1:2021)

Piezelektrische Sensoren - Teil 1: Fachgrundspezifikation (IEC 63041-1:2021)

Capteurs piézoélectriques - Partie 1: Spécifications génériques (IEC 63041-1:2021)

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Ta slovenski standard je istoveten z: **EN IEC 63041-1:2021**

<https://standards.iteh.ai/catalog/standards/sist/6dc1199c-7cec-475b-8be8-d63d3875257/sist-en-iec-63041-1-2022>

ICS:

31.140 Piezelektrične naprave Piezoelectric devices

SIST EN IEC 63041-1:2022

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN IEC 63041-1:2022](#)

<https://standards.iteh.ai/catalog/standards/sist/6dc1199c-7cec-475b-8be8-dfc3d3875257/sist-en-iec-63041-1-2022>

EUROPEAN STANDARD

EN IEC 63041-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2021

ICS 31.140

Supersedes EN IEC 63041-1:2018 and all of its
amendments and corrigenda (if any)

English Version

**Piezoelectric sensors - Part 1: Generic specifications
(IEC 63041-1:2021)**Capteurs piézoélectriques - Partie 1: Spécifications
génériques
(IEC 63041-1:2021)Piezoelektrische Sensoren - Teil 1: Fachgrundspezifikation
(IEC 63041-1:2021)

This European Standard was approved by CENELEC on 2021-10-22. 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, Turkey 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 63041-1:2021 (E)**European foreword**

The text of document 49/1357/CDV, future edition 2 of IEC 63041-1, prepared by IEC/TC 49 "Piezoelectric, dielectric and electrostatic devices and associated materials for frequency control, selection and detection" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 63041-1:2021.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2022-07-22 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2024-10-22 document have to be withdrawn

This document supersedes EN IEC 63041-1:2018 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.

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.

iTeh **Endorsement notice** **PREVIEW** (standards.i-teh.ai)

The text of the International Standard IEC 63041-1:2021 was approved by CENELEC as a European Standard without any modification.

[SIST EN IEC 63041-1:2022](https://standards.i-teh.ai/standards/iec-63041-1-2022)

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

[dfc3d3875257/sist-en-iec-63041-1-2022](https://standards.i-teh.ai/standards/iec-63041-1-2022)

IEC 60068 (series)	NOTE Harmonized as EN 60068 (series)
IEC 60122-1	NOTE Harmonized as EN 60122-1
IEC 60444-1	NOTE Harmonized as EN 60444-1
IEC 60444-5	NOTE Harmonized as EN 60444-5
IEC 60679 (series)	NOTE Harmonized as EN 60679 (series)
IEC 60689	NOTE Harmonized as EN 60689
IEC 60758:2016	NOTE Harmonized as EN 60758:2016 (not modified)
IEC 60862-1	NOTE Harmonized as EN 60862-1
IEC 61019-1	NOTE Harmonized as EN 61019-1
IEC 61240:2016	NOTE Harmonized as EN 61240:2017 (not modified)
IEC 61760 (series)	NOTE Harmonized as EN 61760-4:2015/A1 (series)
IEC 61837 (series)	NOTE Harmonized as EN 61837 (series)
IEC 63041-2	NOTE Harmonized as EN IEC 63041-2
ISO 80000 (series)	NOTE Harmonized as EN ISO 80000 (series)

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.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60027	series	Letter symbols to be used in electrical technology	EN 60027	series
IEC 60050-561	-	International Electrotechnical Vocabulary - Part 561: Piezoelectric, dielectric and electrostatic devices and associated materials for frequency control, selection and detection	-	-
IEC 60122-2-1	-	Quartz crystal units for frequency control and selection - Part 2: Guide to the use of quartz crystal units for frequency control and selection - Section One: Quartz crystal units for microprocessor clock supply	-	-
IEC 60444-9	-	Measurement of quartz crystal unit parameters - Part 9: Measurement of spurious resonances of piezoelectric crystal units	EN 60444-9	-
IEC 60617	-	Graphical symbols for diagrams	-	-
IEC 63041-3	2020	Piezoelectric sensors - Part 3: Physical sensors	EN IEC 63041-3	2020
ISO 2859-1	1999	Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection	-	-
ISO 80000-1	-	Quantities and units - Part 1: General	EN ISO 80000-1	-

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN IEC 63041-1:2022](#)

<https://standards.iteh.ai/catalog/standards/sist/6dc1199c-7cec-475b-8be8-dfc3d3875257/sist-en-iec-63041-1-2022>



IEC 63041-1

Edition 2.0 2021-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Piezoelectric sensors –
Part 1: Generic specifications

Capteurs piézoélectriques –
Partie 1: Spécifications génériques

STANDARD PREVIEW
(standards.iteh.ai)

SIST EN IEC 63041-1:2022

<https://standards.iteh.ai/catalog/standards/sist/6dc1199c-7cec-475b-8be8-dfc3d3875257/sist-en-iec-63041-1-2022>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 31.140

ISBN 978-2-8322-1023-7

**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	5
1 Scope	7
2 Normative references	7
3 Terms and definitions	7
3.1 Piezoelectric sensors	8
3.2 Types of chemical sensors	9
3.3 Types of physical sensors	9
3.4 Types of sensor modules	10
3.5 Types of sensor systems	10
4 Symbols of sensor elements	10
4.1 General	10
4.2 Symbol for sensor elements of BAW resonator type	10
4.3 Symbol for sensor elements of SAW resonator type	11
4.4 Symbol for sensor elements of SAW delay-line type	11
4.5 Symbol for sensor elements of non-acoustic type	12
4.6 Symbol for wireless SAW sensor element	12
4.7 Symbols	14
5 Specifications	14
5.1 Sensor elements	14
5.1.1 General	14
5.1.2 Sensor elements of resonator and delay-line types	14
5.1.3 Sensor elements of non-acoustic type	15
5.2 Frequency ranges	15
5.3 Level of drive or input power	15
5.4 Unwanted response	15
5.5 Analysis of measurements	15
5.6 Enclosure	16
5.7 Performance confirmation	16
5.8 Long-term and short-term stabilities	16
5.9 Transmission power	16
6 Measurement and detection methods	16
7 Delivery conditions	16
7.1 Marking	16
7.2 Wrapping	16
7.3 Packaging	17
8 Quality and reliability	17
8.1 Reuse	17
8.2 Validity of release	17
8.3 Test procedures	17
8.4 Screening requirements	17
8.5 Unchecked parameters	17
9 Test and measurement procedures	17
9.1 General	17
9.1.1 Test classification	17
9.1.2 Shipping test	17

9.1.3	Mechanical and environmental test	18
9.2	Test and measurement conditions	18
9.2.1	Standard conditions for testing	18
9.2.2	Equilibrium state	18
9.2.3	Power supply	18
9.2.4	Alternative test system	19
9.2.5	Visual inspection	19
9.3	Test conditions for shipment	19
9.3.1	Temperature dependence of frequency, phase, insertion loss/gain, motional resistance, and electric charge / voltage	19
9.3.2	Unwanted response	19
9.3.3	Shunt capacitance	19
9.3.4	Insulation resistance	20
Annex A	(normative) Measurement methods	21
A.1	General	21
A.2	Measurement methods using reflection and transmission characteristics	21
A.3	Measurement methods using oscillation circuits	22
A.4	Measurement method of non-acoustic type sensor elements and cells	23
A.5	Other measurement methods	23
Annex B	(normative) Detection methods	24
B.1	General	24
B.2	Detection methods	24
B.2.1	Frequency difference measurement	24
B.2.2	Insertion loss/gain measurement	25
B.2.3	Phase difference measurement	26
B.2.4	Other detection methods	26
Annex C	(normative) Wireless SAW sensor	27
C.1	General	27
C.2	Detection methods	27
C.2.1	General	27
C.2.2	Conceptual diagrams of wireless SAW resonator type sensor system	27
C.2.3	Conceptual diagrams of wireless SAW reflective delay-line type sensor system	27
C.2.4	Key points of detection mechanism	28
C.2.5	Technical documents	28
Bibliography	29
Figure 1	– Conceptual diagrams for sensor elements of BAW resonator type	11
Figure 2	– Symbol for sensor elements of BAW resonator type	11
Figure 3	– Conceptual diagram of sensor elements of SAW resonator type	11
Figure 4	– Symbol for sensor elements of SAW resonator type	11
Figure 5	– Conceptual diagram for sensor elements of SAW delay-line type	12
Figure 6	– Symbol for sensor elements of SAW delay-line type	12
Figure 7	– Conceptual diagrams for sensor elements of non-acoustic type	12
Figure 8	– Symbol for sensor elements of non-acoustic type	12
Figure 9	– Conceptual diagram for basic sensor elements of wireless SAW resonator type	13
Figure 10	– Symbol for basic sensor elements of wireless SAW resonator type	13

Figure 11 – Conceptual diagram for basic sensor elements of wireless SAW reflective delay-line type	13
Figure 12 – Symbol for basic sensor elements of wireless SAW reflective delay-line type	13
Figure A.1 – Measurement method using reflection characteristics of BAW resonator type sensor elements and cells	21
Figure A.2 – Measurement method using reflection characteristics of SAW resonator type sensor elements and cells	21
Figure A.3 – Measurement method using transmission characteristics of SAW delay-line type sensor elements and cells	22
Figure A.4 – Measurement method using oscillation circuit consisting of BAW resonator type sensor elements and cells	22
Figure A.5 – Measurement method using oscillation circuit consisting of SAW resonator type sensor elements and cells	22
Figure A.6 – Measurement method using oscillation circuit consisting of SAW delay-line type sensor elements and cells	23
Figure A.7 – Measurement method using amplifier consisting of non-acoustic type sensor elements and cells.....	23
Figure B.1 – Measurement of frequency difference using two oscillation circuits	24
Figure B.2 – Measurement of frequency difference using an oscillation circuit and frequency synthesizer.....	25
Figure B.3 – Conceptual diagram of piezoelectric dual mode sensor module	25
Figure B.4 – Measurement of insertion loss/gain difference using two oscillation circuits.....	26
Figure B.5 – Measurement of phase difference using signal generator and phase detector	26
Figure C.1 – Fundamental measurement system of wireless SAW resonator type sensor	27
Figure C.2 – Fundamental measurement system of wireless SAW reflective delay-line type sensor.....	28

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PIEZOELECTRIC SENSORS –**Part 1: Generic specifications****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.

IEC 63041-1 has been prepared by IEC technical committee 49: Piezoelectric, dielectric and electrostatic devices and associated materials for frequency control, selection and detection. It is an International Standard.

This second edition cancels and replaces the first edition published in 2017. This edition constitutes a technical revision.

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

- a) the new terms "piezoelectric sensor system" and "wireless SAW sensor system" and their definitions have been added;
- b) new types of sensor modules and sensor system have been added;
- c) some symbols of sensor elements are added in Clause 4;
- d) a new Figure B.3 has been added in Annex B;
- e) Annex C has been added.

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

Draft	Report on voting
49/1357/CDV	49/1364/RVC

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/standardsdev/publications.

A list of all parts in the IEC 63041 series, published under the general title *Piezoelectric sensors*, 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,
- replaced by a revised edition, or
- amended.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN IEC 63041-1:2022](https://standards.iteh.ai/catalog/standards/sist/6dc1199c-7cec-475b-8be8-dfc3d3875257/sist-en-iec-63041-1-2022)

<https://standards.iteh.ai/catalog/standards/sist/6dc1199c-7cec-475b-8be8-dfc3d3875257/sist-en-iec-63041-1-2022>