

Potentiometers for use in electronic equipment - Part
4: Sectional specification: Single-turn rotary power
potentiometers

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>See Eesti standard EVS-EN IEC 60393-4:2023 sisaldab Euroopa standardi EN IEC 60393-4:2023 ingliskeelset teksti.</p> <p>Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.</p> <p>Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 08.12.2023.</p> <p>Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.</p>	<p>This Estonian standard EVS-EN IEC 60393-4:2023 consists of the English text of the European standard EN IEC 60393-4:2023.</p> <p>This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.</p> <p>Date of Availability of the European standard is 08.12.2023.</p> <p>The standard is available from the Estonian Centre for Standardisation and Accreditation.</p>
--	---

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 31.040.20

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardimis- ja Akrediteerimiskeskusele. Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardimis- ja Akrediteerimiskeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardimis- ja Akrediteerimiskeskusega: Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation and Accreditation. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation and Accreditation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation and Accreditation: Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

ICS 31.040.20

English Version

Potentiometers for use in electronic equipment - Part 4:
Sectional specification: Single-turn rotary power potentiometers
(IEC 60393-4:2023)

Potentiomètres utilisés dans les équipements électroniques
- Partie 4: Spécification intermédiaire: Potentiomètres
rotatifs monotours à forte dissipation
(IEC 60393-4:2023)

Potentiometer zur Verwendung in Geräten der Elektronik -
Teil 4: Rahmenspezifikation: Hochbelastbare Einfach-
Drehpotentiometer
(IEC 60393-4:2023)

This European Standard was approved by CENELEC on 2023-11-24. 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

European foreword

The text of document 40/3074/FDIS, future edition 3 of IEC 60393-4, prepared by IEC/TC 40 "Capacitors and resistors for electronic equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60393-4:2023.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2024-08-24
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2026-11-24

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.

A preceding document on the subject covered by this specification has been:

— CECC 41200:1978

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 60393-4:2023 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 60068-1:2013 NOTE Approved as EN 60068-1:2014 (not modified)

IEC 80000 (series) NOTE Approved as EN IEC 80000 (series)

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Potentiometers for use in electronic equipment –
Part 4: Sectional specification: Single-turn rotary power potentiometers**

**Potentiomètres utilisés dans les équipements électroniques –
Partie 4: Spécification intermédiaire: Potentiomètres rotatifs monotours à forte
dissipation**



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2023 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 Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews. 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 22 300 terminological entries in English and French, with equivalent terms in 19 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. 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 22 300 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 19 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Potentiometers for use in electronic equipment –
Part 4: Sectional specification: Single-turn rotary power potentiometers**

**Potentiomètres utilisés dans les équipements électroniques –
Partie 4: Spécification intermédiaire: Potentiomètres rotatifs monotours à forte
dissipation**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 31.040.20

ISBN 978-2-8322-7611-2

**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.....	4
1 Scope.....	6
2 Normative reference.....	6
3 Terms and definitions.....	7
4 Preferred characteristics.....	8
4.1 General.....	8
4.2 Style and dimensions.....	8
4.3 Preferred climatic categories.....	9
4.4 Resistance law.....	9
4.5 Nominal total resistance.....	9
4.6 Tolerances on nominal total resistance.....	9
4.7 Rated dissipation.....	9
4.8 Limiting element voltage.....	10
4.9 Insulation voltage.....	10
4.10 Number of cycles of operation.....	10
4.11 Shaft rotational speed.....	10
5 Tests and test severities.....	10
5.1 General.....	10
5.2 Mounting.....	11
5.3 Tests.....	11
5.3.1 Drying.....	11
5.3.2 Resistance measurement.....	11
5.3.3 Vibration.....	11
5.3.4 Bump.....	11
5.3.5 Shock.....	11
5.3.6 Temperature coefficients and temperature characteristics of resistance.....	12
6 Performance requirements.....	12
6.1 General.....	12
6.2 Limits for change in resistance or output voltage ratio.....	12
6.3 Limits for insulation resistance.....	12
6.4 Limits of temperature rise.....	13
6.5 Limits for resistance law.....	13
6.6 Limits for operating torque.....	13
6.7 Limits for end stop torque.....	13
6.8 Limits for residual resistances.....	14
6.9 Visual inspection.....	14
6.9.1 General visual criteria.....	14
6.9.2 Visual criteria after tests.....	14
6.10 Solderability.....	14
7 Marking, packaging, and ordering information.....	14
7.1 Marking of the component.....	14
7.2 Marking for packaging.....	15
7.3 Additional marking.....	15
7.4 Ordering information.....	15
8 Detail specifications.....	15
8.1 General.....	15

8.2	Information to be specified in a detail specification	15
8.2.1	Outline drawing or illustration	15
8.2.2	Dimensions.....	16
8.2.3	Mounting	16
8.2.4	Resistance law	16
8.3	Ratings and characteristics	16
8.3.1	General	16
8.3.2	Nominal total resistance range	16
8.3.3	Marking	16
8.3.4	Ordering information	16
8.3.5	Additional information	17
9	Quality assessment procedures	17
9.1	General.....	17
9.2	Definitions.....	17
9.2.1	Primary stage of manufacture	17
9.2.2	Structurally similar components	17
9.3	Assessment level EZ.....	17
10	Qualification approval.....	17
10.1	General.....	17
10.2	Qualification approval based on the fixed sample size procedure sampling	17
10.3	Tests	18
11	Quality conformance inspection	25
11.1	Formation of inspection lots	25
11.2	Test schedule	26
11.3	Assessment levels	26
11.4	Delayed delivery	28
12	Apparatus for measuring mechanical accuracy	28
12.1	Dial indicator.....	28
12.2	Cylindrical shaft adaptor	28
12.3	Potentiometer mounting fixture	28
12.4	Potentiometer shaft holding fixture.....	28
Annex A (informative) Letter symbols and abbreviations		29
Bibliography.....		31
Figure 1 – Schematic view		7
Figure 2 – Outline drawing and dimensions.....		8
Figure 3 – Rated dissipation curve		9
Figure 4 – Rated dissipation curve (example of larger area).....		10
Table 1 – Limits for change in resistance or output voltage ratio		12
Table 2 – Limits for operating torque.....		13
Table 3 – Limits for end stop torque		13
Table 4 – Test schedule for qualification approval.....		19
Table 5 – Quality conformance inspection: Lot-by-lot inspection		26
Table 6 – Quality conformance inspection: Periodic testing.....		27

INTERNATIONAL ELECTROTECHNICAL COMMISSION

POTENTIOMETERS FOR USE IN ELECTRONIC EQUIPMENT –**Part 4: Sectional specification:
Single-turn rotary power potentiometers**

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 60393-4 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment. It is an International Standard.

This third edition cancels and replaces the second edition published in 1992 and constitutes a technical revision.

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

- a) the document structure has been organized to follow new sectional specification structure decided in TC 40;
- b) the information on the assessment level EZ and FZ (zero nonconforming) has been revised.

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

Draft	Report on voting
40/3074/FDIS	40/3085/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 parts in the IEC 60393 series, published under the general title *Potentiometers for use in electronic equipment*, 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.

POTENTIOMETERS FOR USE IN ELECTRONIC EQUIPMENT –

Part 4: Sectional specification: Single-turn rotary power potentiometers

1 Scope

This part of IEC 60393 is applicable to single-turn rotary power potentiometers wire-wound technology. Enamelled, cemented, moulded, enclosed.

This specification is applicable to rotary potentiometers with nominal dissipation in excess of 10 W, the resistive element of which consists of a wire or a wound tape. All the potentiometers specified by this specification are slider-driven without reduction. Their stroke less than 360° is limited by stops.

This document specifies preferred ratings and characteristics and selects from IEC 60393-1, appropriate quality assessment procedures, tests and measuring methods. It provides general performance requirements for this type of potentiometer.

This document gives the minimum performance requirements and test severities.

Annex A lists the letters and symbols used in the clauses of this document.

2 Normative reference

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 60062:2016, *Marking codes for resistors and capacitors*
IEC 60062:2016/AMD1:2019

IEC 60063, *Preferred number series for resistors and capacitors*

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 60393-1:2008, *Potentiometers for use in electronic equipment – Part 1: Generic specification*

IEC 60915, *Capacitors and resistors for use in electronic equipment – Preferred dimensions of shaft ends, bushes and for the mounting of single-hole, bush-mounted, shaft-operated electronic components*

IEC 61439-1, *Low-voltage switchgear and control gear assemblies – General rules*

IEC 61193-2:2007, *Quality assessment systems – Part 2: Selection and use of sampling plans for inspection of electronic components and packages*