IEC 62053-22

Edition 2.0 2020-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electricity metering equipment – Particular requirements – Part 22: Static meters for AC active energy (classes 0,1S, 0,2S and 0,5S)

Équipement de comptage de l'électricité – Exigences particulières – Partie 22: Compteurs statiques d'énergie active en courant alternatif (classes 0,1 S, 0,2 S et 0,5 S)

IEC 62053-22:2020-06(en-fr)

Documents
Document Sharing Hub

Full document details: IEC 62053-22-2020

THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2020 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 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 It also gives information on projects, replaced and withdrawn publications.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.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries 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
67 000 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.

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.

Electropedia - www.electropedia.org
Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques 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
67 000 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.

Documents
Document Sharing Hub

Full document details: IEC 62053-22-2020

IEC 62053-22

Edition 2.0 2020-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electricity metering equipment – Particular requirements – Part 22: Static meters for AC active energy (classes 0,1S, 0,2S and 0,5S)

Équipement de comptage de l'électricité – Exigences particulières – Partie 22: Compteurs statiques d'énergie active en courant alternatif (classes 0,1 S, 0,2 S et 0,5 S)

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 17.220.20

ISBN 978-2-8322-8439-1

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

AVA Documents
Document Sharing Hub

Full document details: IEC 62053-22-2020

CONTENTS

FOREWORD 4
INTRODUCTION 6
1 Scope 8
2 Normative references 9
3 Terms and definitions 9
4 Standard electrical values 9
4.1 Voltages 9
4.2 Currents 9
4.2.1 Nominal currents 9
4.2.2 Starting current 10
4.2.3 Minimum current 10
4.2.4 Maximum current 10
4.3 Frequencies 10
4.4 Power consumption 10
5 Construction requirements 10
6 Meter marking and documentation 10
7 Accuracy requirements 10
7.1 General test conditions 10
7.2 Methods of accuracy verification 10
7.3 Measurement uncertainty 11
7.4 Meter constant 11
7.5 Initial start-up of the meter 11
7.6 Test of no-load condition 11
7.7 Starting current test 11
7.8 Repeatability test 11
7.9 Limits of error due to variation of the current 11
7.10 Limits of error due to influence quantities 12
7.11 Time-keeping accuracy 14
8 Climatic requirements 14
9 The effects of external influences 14
10 Type test 14
Annex A (informative) Comparison of acceptable percentage error limits at reference conditions for meters of classes 0,1 S, 0,2 S, and 0,5 S 15
Annex B (informative) Summary of changes 17

Figure A.1 – Comparison of acceptable percentage error limits for meters of classes 0,1 S, 0,2 S,and 0,5 S, with I_n = 5 A and I_{max} = 10 A, at PF = 1,0 15
Figure A.2 – Comparison of acceptable percentage error limits for meters of classes 0,1 S, 0,2 S, and 0,5 S, with I_n = 5 A and I_{max} = 10 A, at PF = 0,5 inductive or PF = 0,8 capacitive 16

Table 1 – Starting current 10
Table 2 – Minimum current 10
Table 3 – Acceptable percentage error limits (single-phase meters and poly-phase meters with balanced loads or single-phase loads) 12

AVA Documents
Document Sharing Hub
Full document details: IEC 62053-22-2020

Table 4 – Acceptable limits of variation in percentage error due to influence quantities.....13

Documents
Document Sharing Hub

Full document details: IEC 62053-22-2020

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICITY METERING EQUIPMENT – PARTICULAR REQUIREMENTS –

Part 22: Static meters for AC active energy (classes 0,1 S, 0,2 S and 0,5 S)

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 62053-22 has been prepared by IEC technical committee 13: Electrical energy measurement and control.

This second edition cancels and replaces the first edition published in 2003 and its amendment 1: 2016. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition: see Annex B.

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

FDIS	Report on voting
13/1806A/FDIS	13/1814/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.

AVA Documents
Document Sharing Hub

Full document details: IEC 62053-22-2020

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

A list of all parts in the IEC 62053 series, published under the general title *Electricity metering equipment – Particular requirements*, 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 "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.

NOTE The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 2 years from the date of publication.

Documents
Document Sharing Hub

Full document details: IEC 62053-22-2020

INTRODUCTION

This part of IEC 62053 is to be used with relevant parts of the IEC 62052, IEC 62058 and IEC 62059 series, *Electricity metering equipment*, and with the IEC 62055 series, *Electricity metering – Payment systems*:

IEC 62052-11:2020,	*Electricity metering equipment – General requirements, tests and test conditions – Part 11: Metering equipment*
IEC 62052-31:2015,	*Electricity metering equipment (AC) – General requirements, tests and test conditions – Part 31: Product safety requirements and tests*
IEC 62053-11:2003,	*Electricity metering equipment (AC) – Particular requirements – Part 11: Electromechanical meters for active energy (classes 0,5, 1 and 2)*
IEC 62053-21:2020,	*Electricity metering equipment – Particular requirements – Part 21: Static meters for AC active energy (classes 0,5, 1 and 2)*
IEC 62053-23:2020,	*Electricity metering equipment – Particular requirements – Part 23: Static meters for reactive energy (classes 2 and 3)*
IEC 62053-24:2020,	*Electricity metering equipment – Particular requirements – Part 24: Static meters for fundamental component reactive energy (classes 0,5 S, 1S, 1, 2 and 3)*
IEC 62055-31:2005,	*Electricity metering – Payment systems – Part 31: Particular requirements – Static payment meters for active energy (classes 1 and 2)*
IEC 62057-1: –	*Test equipment, techniques and procedures for electrical energy meters – Part 1: Stationary Meter Test Units (MTU)*
IEC 62058-11:2008,	*Electricity metering equipment (AC) – Acceptance inspection - –Part 11: General acceptance inspection methods*
IEC 62058-21:2008,	*Electricity metering equipment (AC) – Acceptance inspection – Part 21: Particular requirements for electromechanical meters for active energy (classes 0,5, 1 and 2)*
IEC 62058-31:2008,	*Electricity metering equipment (AC) – Acceptance inspection – Part 31: Particular requirements for static meters for active energy (classes 0,2 S, 0,5 S, 1 and 2)*
IEC 62059-11:2002,	*Electricity metering equipment – Dependability – Part 11: General concepts*
IEC 62059-21:2002,	*Electricity metering equipment – Dependability – Part 21: Collection of meter dependability data from the field*
IEC 62059-32-1:2011,	*Electricity metering equipment – Dependability – Part 32-1: Durability – Testing of the stability of metrological characteristics by applying elevated temperature*

This part is a standard for type testing electricity meters. It covers the particular requirements for meters, being used indoors and outdoors in large quantities worldwide. It does not deal with special implementations (such as metering-part and/or displays in separate housings).

This document is intended to be used in conjunction with IEC 62052-11:2020 and with IEC 62052-31:2015. When any requirement in this document concerns an item already covered in IEC 62052-11:2020 or in IEC 62052-31:2015, the requirements of this document take precedence over the requirements of IEC 62052-11:2020 or of IEC 62052-31:2015.

AVA Documents
Document Sharing Hub

Full document details: IEC 62053-22-2020

The test levels are regarded as minimum values that provide for the proper functioning of the meter under normal working conditions. For special applications, additional test levels might be necessary and are subject to an agreement between the manufacturer and the purchaser.

Documents
Document Sharing Hub

Full document details: IEC 62053-22-2020

ELECTRICITY METERING EQUIPMENT – PARTICULAR REQUIREMENTS –

Part 22: Static meters for AC active energy (classes 0,1 S, 0,2 S and 0,5 S)

1 Scope

This part of IEC 62053 applies only to transformer operated static watt-hour meters of accuracy classes 0,1 S, 0,2 S and 0,5 S for the measurement of alternating current electrical active energy in 50 Hz or 60 Hz networks and it applies to their type tests only.

NOTE 1 For other general requirements, such as safety, dependability, etc., see the relevant IEC 62052 or IEC 62059 standards.

This document applies to electricity metering equipment designed to:

- measure and control electrical energy on electrical networks (mains) with voltage up to 1 000 V;

NOTE 2 For AC electricity meters, the voltage mentioned above is the line-to-neutral voltage derived from nominal voltages. See IEC 62052-31:2015, Table 7.

- have all functional elements, including add-on modules, enclosed in, or forming a single meter case with exception of indicating displays;
- operate with integrated or detached indicating displays, or without an indicating display;
- be installed in a specified matching socket or rack;
- optionally, provide additional functions other than those for measurement of electrical energy.

NOTE 3 Modern electricity meters typically contain additional functions such as measurement of voltage magnitude, current magnitude, power, frequency, power factor, etc.; measurement of power quality parameters; load control functions; delivery, time, test, accounting, recording functions; data communication interfaces and associated data security functions. The relevant standards for these functions may apply in addition to the requirements of this document. However, the requirements for such functions are outside the scope of this document.

NOTE 4 Product requirements for power metering and monitoring devices (PMDs) and measurement functions such as voltage magnitude, current magnitude, power, frequency, etc., are covered in IEC 61557-12. However, devices compliant with IEC 61557-12 are not intended to be used as billing meters unless they are also compliant with the IEC 62052-11:2020 and one or more relevant IEC 62053-xx accuracy class standards.

NOTE 5 Product requirements for power quality instruments (PQIs) are covered in IEC 62586-1. Requirements for power quality measurement techniques (functions) are covered in IEC 61000-4-30. Requirements for testing of the power quality measurement functions are covered in IEC 62586-2.

This document does not apply to:

- meters for which the voltage line-to-neutral derived from nominal voltages exceeds 1 000 V;
- meters intended for connection with low power instrument transformers (LPITs as defined in the IEC 61869 series) when tested without such transformers;
- metering systems comprising multiple devices physically remote from one another.
- portable meters;

NOTE 6 Portable meters are meters that are not permanently connected.

- meters used in rolling stock, vehicles, ships and airplanes;
- laboratory and meter test equipment;
- reference standard meters;
- data interfaces to the register of the meter;

AVA Documents Document Sharing Hub

Full document details: IEC 62053-22-2020

- matching sockets or racks used for installation of electricity metering equipment;
- any additional functions provided in electrical energy meters.

This document does not cover measures for the detection and prevention of fraudulent attempts to compromise a meter's performance (tampering).

NOTE 7 Nevertheless, specific tampering detection and prevention requirements, and test methods, as relevant for a particular market are subject to the agreement between the manufacturer and the purchaser.

NOTE 8 Specifying requirements and test methods for fraud detection and prevention would be counterproductive, as such specifications would provide guidance for potential fraudsters.

NOTE 9 There are many types of meter tampering reported from various markets; therefore, designing meters to detect and prevent all types of tampering could lead to unjustified increase in costs of meter design, verification and validation.

NOTE 10 Billing systems, such as, smart metering systems, are capable of detecting irregular consumption patterns and irregular network losses which enable discovery of suspected meter tampering.

NOTE 11 For transformer operated meters paired with current transformers (CTs) according to IEC 61869-2:

– the standard CT measuring range is specified from 0,05 I_n to I_{max} for accuracy classes 0,1, 0,2, 0,5 and 1 and these CTs are used for meters of class 0,5, 1 and 2 according to IEC 62053-21;
– the special CT measuring range is specified from 0,01 I_n to $_{Imax}$ for accuracy classes 0,2 S and 0,5 S and these CTs are used for meters of class 0,1 S, 0,2 S and 0,5 S according to this document;
– combinations of standard CTs and meters of class 0,1 S, 0,2 S and 0,5 S are subject to an agreement between manufacturers and purchasers.

NOTE 12 This document does not specify emission requirements, these are specified in IEC 62052-11:2020, 9.3.14.

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 62052-11:2020, *Electricity metering equipment – General requirements, tests and test conditions – Part 11: Metering equipment*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62052-11:2020 apply.

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

- IEC Electropedia website: http://www.electropedia.org
- ISO Online Browsing Platform website: http://www.iso.org/obp

4 Standard electrical values

4.1 Voltages

The values given in IEC 62052-11:2020 apply.

4.2 Currents

4.2.1 Nominal currents

The values given in IEC 62052-11:2020 apply.

Documents
Document Sharing Hub
Full document details: IEC 62053-22-2020

4.2.2 Starting current

The requirements and acceptance criteria of IEC 62052-11:2020 apply (see Table 1).

Table 1 – Starting current

Meters for	Class of meter			Power factor
	0,1 S	0,2 S	0,5 S	cos φ
Connection through current transformers	0,001 I_n	0,001 I_n	0,001 I_n	1

4.2.3 Minimum current

The requirements and acceptance criteria of IEC 62052-11:2020 apply (see Table 2).

Table 2 – Minimum current

Meters for	Minimum current I_{min} classes 0,1 S, 0,2 S, 0,5 S
Connection through current transformers	0,01 I_n

4.2.4 Maximum current

The requirements and acceptance criteria of IEC 62052-11:2020 apply.

4.3 Frequencies

The values given in IEC 62052-11:2020 apply.

4.4 Power consumption

The requirements, test conditions and procedures, and acceptance criteria of IEC 62052-11:2020 apply.

5 Construction requirements

The requirements, test conditions and procedures, and acceptance criteria of IEC 62052-11:2020 apply.

6 Meter marking and documentation

The requirements of IEC 62052-11:2020 apply.

7 Accuracy requirements

7.1 General test conditions

The test conditions of IEC 62052-11:2020 apply.

7.2 Methods of accuracy verification

The requirements, test conditions and procedures, and acceptance criteria of IEC 62052-11:2020 apply.

Documents
Document Sharing Hub
Full document details: IEC 62053-22-2020