



PRE-RELEASE VERSION (FDIS)

**Electricity metering equipment – General requirements, tests and test conditions –
Part 41: Energy registration methods and requirements for multi-energy and multi-rate meters**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 17.220.20

Warning! Make sure that you obtained this publication from an authorized distributor.



FINAL DRAFT INTERNATIONAL STANDARD (FDIS)

PROJECT NUMBER:

IEC 62052-41 ED1

DATE OF CIRCULATION:

2022-07-29

CLOSING DATE FOR VOTING:

2022-09-09

SUPERSEDES DOCUMENTS:

13/1845/CDV, 13/1859/RVC

IEC TC 13 : ELECTRICAL ENERGY MEASUREMENT AND CONTROL	
SECRETARIAT: Hungary	SECRETARY: Mr Bela Bodi
OF INTEREST TO THE FOLLOWING COMMITTEES:	HORIZONTAL STANDARD: <input type="checkbox"/>
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> 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 Final Draft International Standard (FDIS) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING

This document is a draft distributed for approval. It may not be referred to as an International Standard until published as such.

In addition to their evaluation as being acceptable for industrial, technological, commercial and user purposes, Final Draft International Standards may on occasion have to be considered in the light of their potential to become standards to which reference may be made in national regulations.

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:

Electricity metering equipment – General requirements, tests and test conditions – Part 41: Energy registration methods and requirements for multi-energy and multi-rate meters

PROPOSED STABILITY DATE: 2024

NOTE FROM TC/SC OFFICERS:

CONTENTS

FOREWORD	4
INTRODUCTION	6
1 Scope	8
2 Normative references	9
3 Terms and definitions	10
3.1 Definitions related to energy meters	10
3.2 Definitions related to energy registers	10
3.3 Definitions related to demand	11
3.4 Definitions related to interval data	11
4 Standard electrical values	12
5 Construction requirements	12
5.1 General	12
5.2 Maximum demand reset mechanism	12
6 Meter marking and documentation	12
7 Accuracy requirements	12
8 Multi-energy and multi-rate meters	12
8.1 General	12
8.2 Overview	13
8.3 Energy calculation methods – Calculation methods for active energy in multi-phase systems	13
8.4 Registers	14
8.4.1 General	14
8.4.2 Energy registers	14
8.4.3 Maximum demand registers	15
8.4.4 Load profile (interval) registers	15
8.4.5 Billing profile data	16
8.5 Tariff switching schedules	16
8.6 Limits of error due to varying energy flow directions (bi-directional metering)	17
8.7 Loss compensation	18
9 Climatic requirements	18
10 The effects of external influences	18
11 Type test	18
Annex A (informative) Example of test sequence for energy and load profile registers	19
Annex B (informative) Example of test sequence for demand measurement	21
Annex C (informative) Error calculations for varying power flow direction test	22
Bibliography	24
Figure C.1 – Vectorial and algebraic computation methods	22
Table 1 – Minimum storage depth in days	16
Table 2 – Relative error limits under varying energy flow directions for static meters for AC active energy (classes 0,1 S, 0,2 S, 0,5 S, 0,5, 1 and 2)	17
Table 3 – Relative error limits under varying energy flow directions for static meters for AC reactive energy (classes 0,5 S, 1 S, 1, 2 and 3)	17

Table A.1 – Example of season 1 switching schedule	19
Table A.2 – Example of season 2 switching schedule	20

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICITY METERING EQUIPMENT – GENERAL REQUIREMENTS, TESTS AND TEST CONDITIONS –

Part 41: Energy registration methods and requirements for multi-energy and multi-rate meters

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 62052-41 has been prepared by IEC technical committee 13: Electrical energy measurement and control. It is an International Standard.

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

Draft	Report on voting
13/XX/FDIS	13/XX/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.

A list of all parts in the IEC 62052 series, published under the general title *Electricity metering equipment – General requirements, tests and test conditions*, can be found on the IEC website.

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.

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.

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.

INTRODUCTION

IEC 62052 series and IEC 62053 series define the physical, safety and metrological aspects of electricity meters. This document defines the requirements for multi-energy and multi-rate meters.

This part of IEC 62052 is to be used with relevant parts of the IEC 62052, IEC 62053, IEC 62055-31, IEC 62058 and IEC 62059 series:

- 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/AMD1:2016, *Electricity metering equipment (a.c.) – 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 62053-22:2020, *Electricity metering equipment – Particular requirements – Part 22: Static meters for AC active energy (classes 0,1 S, 0,2 S and 0,5 S)*
- 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, 1 S, 1, 2 and 3)*
- IEC 62053-41:2021, *Electricity metering equipment – Particular requirements – Part 41: Static meters for DC energy (classes 0,5 and 1)*
- IEC 62055-31:2022, *Electricity metering – Payment systems – Part 31: Particular requirements – Static payment meters for active energy (classes 0,5, 1 and 2)*
- 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 TR 62059-11:2002, *Electricity metering equipment – Dependability – Part 11: General concepts*
- IEC TR 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 of IEC 62052 is a standard for type testing electricity meters. This document is intended to be used in conjunction with the relevant parts of IEC 62052, IEC 62053 and IEC 62055-31. When any requirement in this document concerns an item already covered in the relevant parts of IEC 62052, IEC 62053 and IEC 62055-31, the requirements of this document take precedence.

The test levels are regarded as minimum values that provide for the proper functioning of the meter under normal working conditions. For special application, other test levels might be necessary and should be agreed on between the manufacturer and the purchaser.

ELECTRICITY METERING EQUIPMENT – GENERAL REQUIREMENTS, TESTS AND TEST CONDITIONS –

Part 41: Energy registration methods and requirements for multi-energy and multi-rate meters

1 Scope

This part of IEC 62052 applies only to newly manufactured multi-energy and/or multi-rate static meters and it applies to their type tests only.

NOTE 1 For other general requirements, such as electrical, mechanical, safety, marking, dependability, etc., see the relevant parts of IEC 62052 or IEC 62059. For accuracy requirements and other requirements specific to class indices, see the relevant parts of IEC 62053.

This document applies to electricity metering equipment designed to:

- measure and control electrical energy on networks with voltage up to 1 000 V AC, or 1 500 V DC;

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.

NOTE 3 For meters designed for operation with LPITs, only the metering unit is considered a low voltage device. If the LPITs are rated for voltages exceeding 1 000 V AC, or 1 500 V DC, the combination of the metering unit and LPITs is not a low voltage device.

- have all functional elements, including add-on modules, enclosed in, or forming a single meter case with exception of indicating displays;
- operate with integrated displays;
- operate with 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.

Meters designed for operation with Low Power Instrument Transformers (LPITs as defined in the IEC 61869 series) may be tested for compliance with this document and the relevant IEC 62053 series documents only if such meters and their LPITs are tested together as directly connected meters.

NOTE 4 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 5 Product requirements for power monitoring devices 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 IEC 62052-11 and relevant IEC 62053-xx accuracy class standards.

NOTE 6 Product requirements for power quality monitoring instruments 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 AC, or 1 500 V DC;
- meters intended for connection with low power instrument transformers (LPITs as defined in the IEC 61869 series of standards) when tested without such transformers;
- metering systems comprising multiple devices (except for LPITs) physically remote from one another;
- portable meters;

NOTE 7 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;

NOTE 8 Nominal values, accuracy classes, requirements and test methods for reference standard meters are specified in IEC 62057-1.

- data interfaces to the register of the meter;
- matching sockets or racks used for installation of electricity metering equipment.

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

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 61869 (all parts), *Instrument transformers*

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

IEC 62053-21:2020, *Electricity metering equipment – Particular requirements – Part 21: Static meters for AC active energy (classes 0,5, 1 and 2)*

IEC 62053-22:2020, *Electricity metering equipment – Particular requirements – Part 22: Static meters for AC active energy (classes 0,1 S, 0,2 S and 0,5 S)*

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, 1 S, 1, 2 and 3)*

IEC 62053-41:2021, *Electricity metering equipment – Particular requirements – Part 41: Static meters for DC energy (classes 0,5 and 1)*