

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Electricity metering equipment (a.c.) – Particular requirements –
Part 24: Static meters for reactive energy at fundamental frequency (classes
0,5 S, 1 S and 1)**

**Équipement de comptage de l'électricité (c.a.) – Exigences particulières –
Partie 24: Compteurs statiques d'énergie réactive à la fréquence fondamentale
(classes 0,5 S, 1 S et 1)**

IEC 62053-24:2014

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**Electricity metering equipment (a.c.) – Particular requirements –
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRICITY METERING EQUIPMENT (a.c.) –
PARTICULAR REQUIREMENTS –****Part 24: Static meters for reactive energy at fundamental frequency
(classes 0,5 S, 1 S and 1)**

FOREWORD

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 62053-24 edition 1.1 contains the first edition (2014-06) [documents 13/1569/FDIS and 13/1578/RVD] and its amendment 1 (2016-11) [documents 13/1703/FDIS and 13/1717/RVD].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 62053-24 has been prepared by IEC technical committee 13: Electrical energy measurement and control.

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

A list of all parts of IEC series 62053, under the general title *Electricity metering equipment (a.c.) – Particular requirements*, can be found on the IEC website.

The committee has decided that the contents of the base publication and its amendment 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- withdrawn,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.

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 4 years from the date of publication.

The contents of the corrigendum of March 2018 have been included in this copy.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This part of IEC 62053 is to be used with the following relevant parts of the IEC 62052, IEC 62053 and IEC 62059 series, *Electricity metering equipment*:

IEC 62052-11:2003, *Electricity metering equipment (AC) – General requirements, tests and test conditions – Part 11: Metering equipment*
Amendment 1 (2016)

IEC 62052-31:2015, *Electricity metering equipment (AC) – General requirements, tests and test conditions – Part 31: Product safety requirements and tests*

IEC 62053-21:2003, *Electricity metering equipment (a.c.) – Particular requirements – Part 21: Static meters for active energy (classes 1 and 2)*

IEC 62053-22:2003, *Electricity metering equipment (a.c.) – Particular requirements – Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)*

IEC 62053-31:1998, *Electricity metering equipment (a.c.) – Particular requirements – Part 31: Pulse output devices for electromechanical and electronic meters (two wires only)*

IEC 62053-52:2005, *Electricity metering equipment (a.c.) – Particular requirements – Part 52: Symbols*

IEC 62053-61:1998, *Electricity metering equipment (a.c.) – Particular requirements – Part 61: Power consumption and voltage requirements*

IEC 62059-11:2002, *Electricity metering equipment (a.c.) – Dependability – Part 11: General concepts*

IEC 62059-21:2002, *Electricity metering equipment (a.c.) – Dependability – Part 21: Collection of meter dependability data from the field*

IEC 62059-31-1:2008, *Electricity metering equipment – Dependability – Part 31-1: Accelerated reliability testing – Elevated temperature and humidity*

IEC 62059-32-1:2011, *Electricity metering equipment – Dependability – Part 32-1: Durability – Testing of the stability of metrological characteristics by applying elevated temperature*

IEC 62059-41:2006, *Electricity metering equipment – Dependability – Part 41: Reliability prediction*

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

This standard is intended to be used in conjunction with IEC 62052-11. When any requirement in this standard concerns an item already covered in IEC 62052-11, the requirements of this standard take precedence over the requirements of IEC 62052-11.

This standard distinguishes:

- between transformer operated meters of accuracy class index 0,5 S and 1 S and direct connected meters of accuracy class index 1;
- between protective class I and protective class II meters;
- between meters for use in networks equipped with or without earth fault neutralizers.

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 user and the manufacturer.

INTRODUCTION TO AMENDMENT 1

The purpose of this amendment is to identify and remove all safety related requirements and tests of IEC 62053-24:2014 that are replaced and extended by the complete set of requirements and tests in IEC 62052-31:2015.

Withdrawing

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ELECTRICITY METERING EQUIPMENT (a.c.) – PARTICULAR REQUIREMENTS –

Part 24: Static meters for reactive energy at fundamental frequency (classes 0,5 S, 1 S and 1)

1 Scope

This part of IEC 62053 applies only to newly manufactured transformer operated static var-hour meters of accuracy classes 0,5 S, and 1 S as well as direct connected static var-hour meters of accuracy class 1, for the measurement of alternating current electrical reactive energy in 50 Hz or 60 Hz networks and it applies to their type tests only.

This standard uses a conventional definition of reactive energy where the reactive power and energy is calculated from the fundamental frequency components of the currents and voltages only. See Clause 3.

NOTE 1 This differs from the approach of IEC 62053-23, where reactive power and energy is defined only for sinusoidal signals. In this standard reactive power and energy is defined for all periodic signals. Reactive power and energy is defined in this way to achieve proper reproducibility of measurements with meters of different designs. With this definition, reactive power and energy reflects the generally unnecessary current possible to compensate with capacitors rather than the total unnecessary current.

It applies only to static var-hour meters for indoor and outdoor application consisting of a measuring element and register(s) enclosed together in a meter case. It also applies to operation indicator(s) and test output(s). If the meter has a measuring element for more than one type of energy (multi-energy meters), or when other functional elements, like maximum demand indicators, electronic tariff registers, time switches, ripple control receivers, data communication interfaces, etc., are enclosed in the meter case, then the relevant standards for these elements also apply.

NOTE 2 IEC 61869-2:2012 describes transformers having a measuring range of $0,05 I_n$ to I_{max} for accuracy classes 0,2, 0,5, 1 and 2, and transformers having a measuring range of $0,01 I_n$ to I_{max} for accuracy classes 0,2 S and 0,5 S. As the measuring range of a meter and its associated transformers have to be matched and as only transformers of classes 0,2 S / 0,5 S have the current error and phase displacement characteristics suitable to operate a class 0,5 S / 1 S meter respectively as specified in this standard, the measuring range of the transformer operated meters will be $0,01 I_n$ to I_{max} . Reactive meters intended to be used together with non-S transformers are, therefore, not covered by this standard.

It does not apply to:

- var-hour meters where the voltage across the connection terminals exceeds 600 V (line-to-line voltage for meters for polyphase systems);
- portable meters;
- data interfaces to the register of the meter;
- reference meters.

The dependability aspect is covered by the standards of the IEC 62059 series.

The safety aspect is covered by IEC 62052-31:2015.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62052-11:2003, *Electricity metering equipment (AC) – General requirements, tests and test conditions – Part 11: Metering equipment Amendment 1 (2016)*

IEC 62052-31:2015, *Electricity metering equipment (AC) – General requirements, tests and test conditions – Part 31: Product safety requirements and tests*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62052-11 apply with the following exception:

3.1 reactive power

Q

reactive power Q in a single phase system is defined for steady-state and periodic signals as

$$Q = U_1 * I_1 * \sin \phi_1$$

where U_1 and I_1 are the r.m.s. values of the fundamental frequency components of the voltage and the current respectively, and

ϕ_1 is the phase angle between them. The reactive power in poly-phase system is the algebraic sum of the per-phase reactive powers:

$$Q = U_{L1} * I_{L1} * \sin \phi_{L1} + U_{L2} * I_{L2} * \sin \phi_{L2} + \dots$$

where

L1 and L2 are the first and second phase of the system.

Note 1 to entry: For direction of flow and sign of reactive power, see Annex C.

Note 2 to entry: The actual algorithm used for the calculation of reactive power is not of importance as long as the meter meets requirements of this standard. See also Annex E.

Note 3 to entry: While meters for active energy have to measure active energy including harmonic components, reactive energy meters according to this standard have to measure fundamental component reactive energy, with minimum influence from harmonics.

4 Standard electrical values

The values given in IEC 62052-11 apply.

5 Mechanical requirements

The requirements of IEC 62052-11 apply.

6 Climatic conditions

The conditions given in IEC 62052-11 apply.

7 Electrical requirements

7.1 General

In addition to the electrical requirements in IEC 62052-11, meters shall fulfil the following requirements.

7.2 Power consumption

7.2.1 General

The power consumption in the voltage and current circuit shall be determined at reference values of the influence quantities given in 8.6 by any suitable method. The overall uncertainty of the measurement of the power consumption shall not exceed 5 %.

7.2.2 Voltage circuits

The active and apparent power consumption in each voltage circuit of a meter at reference voltage, reference temperature and reference frequency shall not exceed the values shown in Table 1.

Table 1 – Power consumption in voltage circuits for single-phase and polyphase meters including the power supply

Meters	Power supply connected to the voltage circuits	Power supply not connected to the voltage circuits
Voltage circuit	2 W and 10 VA	0,5 VA
Auxiliary power supply	–	10 VA
<p>NOTE 1 In order to match voltage transformers to meters, the meter manufacturer should state whether the burden is inductive or capacitive (for transformer operated meters only).</p> <p>NOTE 2 The above figures are mean values. Switching power supplies with peak values in excess of these specified values are permitted, but it should be ensured that the rating of associated voltage transformers is adequate.</p> <p>NOTE 3 For multifunctional meters, see IEC 62053-61.</p>		

7.2.3 Current circuits

The apparent power taken by each current circuit of a direct connected meter at basic current, reference frequency and reference temperature shall not exceed the values shown in Table 2.

The apparent power taken by each current circuit of a meter connected through a current transformer shall not exceed the value shown in Table 2, at a current value that equals the rated secondary current of the corresponding transformer, at reference temperature and reference frequency of the meter.