

# 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)**



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## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references .....	7
3 Terms and definitions .....	8
4 Standard electrical values .....	8
5 Mechanical requirements.....	8
6 Climatic conditions .....	8
7 Electrical requirements .....	8
7.1 General.....	8
7.2 Power consumption.....	9
7.2.1 General .....	9
7.2.2 Voltage circuits.....	9
7.2.3 Current circuits.....	9
7.3 Influence of short-time overcurrents .....	9
7.4 Influence of self-heating.....	10
7.5 AC voltage test .....	11
8 Accuracy requirements .....	11
8.1 General.....	11
8.2 Limits of error due to variation of the current.....	11
8.3 Limits of error due to influence quantities.....	12
8.3.1 General .....	12
8.3.2 Tests of the influence of DC and even harmonics in the current circuit .....	14
8.3.3 Continuous magnetic induction of external origin .....	14
8.3.4 Harmonics .....	14
8.4 Test of starting and no-load condition .....	15
8.4.1 General .....	15
8.4.2 Initial start-up of the meter.....	15
8.4.3 Test of no-load condition .....	15
8.4.4 Starting.....	16
8.5 Meter constant.....	16
8.6 Accuracy test conditions .....	16
8.7 Interpretation of test results .....	17
Annex A (normative) Test circuit diagram for DC and even harmonics .....	18
Annex B (normative) Electromagnet for testing the influence of externally produced magnetic fields .....	20
Annex C (informative) Geometric representation of active and reactive power .....	21
Annex D (informative) Effect of phase displacement .....	23
D.1 Phase displacement and matching of current transformers and meters for reactive energy .....	23
Annex E (informative) Treatment of harmonics and tests for harmonics .....	24
E.1 Non-sinusoidal conditions and reactive power definition.....	24
E.2 Tests for accuracy under non-sinusoidal conditions .....	24
E.3 Fifth harmonic test .....	25
Bibliography.....	26

Figure A.1 – Test circuit diagram for half-wave rectification .....	18
Figure A.2 – Half-wave rectified waveform .....	19
Figure B.1 – Electromagnet for testing the influence of externally produced magnetic fields.....	20
Figure C.1 – Recommended geometric representation .....	21
Figure C.2 – Alternative geometric representation .....	22
Table 1 – Power consumption in voltage circuits for single-phase and polyphase meters including the power supply .....	9
Table 2 – Power consumption in current circuits .....	9
Table 3 – Variations due to short-time overcurrents .....	10
Table 4 – Variations due to self-heating .....	10
Table 5 – AC voltage tests.....	11
Table 6 – Percentage error limits (single-phase meters and polyphase meters with balanced loads) .....	12
Table 7 – Percentage error limits (polyphase meters carrying a single-phase load, but with balanced polyphase voltages applied to voltage circuits) .....	12
Table 8 – Influence quantities .....	13
Table 9 – Starting current .....	16
Table 10 – Voltage and current balance .....	16
Table 11 – Reference conditions.....	17
Table 12 – Interpretation of test results.....	17
Table D.1 – Limits of phase displacement for measuring current transformers and corresponding measurement error for reactive energy measurement .....	23

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

The text of this standard is based on the following documents:

FDIS	Report on voting
13/1569/FDIS	13/1578/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

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 this publication 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.

## 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 (a.c.) – General requirements, tests and test conditions – Part 11: Metering equipment*

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.



## 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.

#### 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 (a.c.) – 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 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

$$Q = U_1 * I_1 * \sin \varphi_1$$

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

$\varphi_1$  is the phase angle between them. The reactive power in poly-phase system is the algebraic sum of the per-phase reactive powers:

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

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.