

Alternating current static var-hour meters for reactive energy (classes 2 and 3)

The European Standard EN 61268:1996 has the status of a
British Standard

ICS 17.220.20

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee PEL/13, Electricity meters, upon which the following bodies were represented:

- Building Automation and Mains Signalling Association (BAMSA)
- BEAMA Metering Association (BMA)
- Department of Trade and Industry
- Electricity Association
- Electricity Pool of England and Wales
- Energy Systems Trade Association
- Flag Association
- Institution of Electrical Engineers
- Office of Electricity Regulations (OFFER)
- United Kingdom Automatic Meter Reading Association

This British Standard, having been prepared under the direction of the Electrotechnical Sector Board, was published under the authority of the Standards Board and comes into effect on 15 December 1996

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The following BSI references relate to the work on this standard:
Committee reference PEL/13
Draft for comment 92/23181 DC

ISBN 0 580 26083 6

Amendments issued since publication

Amd. No.	Date	Comments

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National foreword

This British Standard has been prepared by Technical Committee PEL/13 and is the English language version of EN 61268:1996 *Alternating current static var-hour meters for reactive energy (classes 2 and 3)*, published by the European Committee for Electrotechnical Standardization (CENELEC). It is identical with IEC 1268:1995 published by the International Electrotechnical Commission (IEC). Annex ZB is a normative annex giving special national conditions for Austria, Germany and the Netherlands.

BS 5685-4 (Technically equivalent to IEC 145:1963), has been made obsolescent.

Cross-references

Publication referred to	Corresponding British Standard
HD 472 S1:1989 (IEC 38:1993)	BS 7697:1993 <i>Nominal voltages for low voltage public electricity supply systems</i> BS 4727 <i>Glossary of electrotechnical, power, telecommunication, electronics, lighting and colour terms</i> Part 1 <i>Terms common to power, telecommunications and electronics</i>
IEC 50(301):1983	Group 04:1986 <i>Measurement terminology</i> Includes chapter 301 <i>General terms on measurements in electricity</i>
IEC 50(302):1983	Group 04:1986 <i>Measurement terminology</i> Includes Chapter 302 <i>Electrical measuring instruments</i>
IEC 50(303):1983	Group 04:1986 <i>Measurement terminology</i> Includes Chapter 303 <i>Electrical measuring instruments</i>
HD 588.1 S1:1991 (IEC 60 series)	BS 923 <i>Guide on high-voltage testing techniques</i> Part 1:1990 <i>General</i>
EN 60060-2:1994 (IEC 60 series)	BS EN 60060-2:1995 <i>High-voltage testing techniques</i> Part 2 <i>Measuring systems</i> BS EN 60068 <i>Environmental testing</i>
EN 60068-2-1:1993 (IEC 68-2-1:1990)	Part 2: <i>Test methods</i> Section 2.1:1993 <i>Tests A. Cold</i>
EN 60068-2-2:1993 (IEC 68-2-2:1974)	Section 2.2:1993 <i>Tests B. Dry heat</i>
HD 323.2.5 S1:1988 (IEC 68-2-5:1975)	BS 2011 <i>Environmental testing</i> Part 2.1 <i>Tests</i> Part 2.1Sa:1977 <i>Test Sa. Simulated solar radiation at ground level</i>
EN 60068-2-6:1995 (IEC 68-2-6:1982)	BS EN 60068-2-6:1996 <i>Environmental testing</i> Part 2 <i>Test methods</i> Section 2.6 <i>Test Fc. Vibration (sinusoidal)</i>
HD 323.2.11 S1:1988 (IEC 68-2-11:1981)	BS 2011 <i>Environmental testing</i> Part 2.1 <i>Tests</i> Part 2.1 Ka:1982 <i>Test Kq. Salt mist</i>

EN 60068-2-27:1993 (IEC 68-2-27:1987)	BS EN 60068-2-27:1993 <i>Environmental testing</i> Part 2 <i>Test methods</i> Section 2.27 <i>Test Ea and guidance: shock</i>
HD 323.2.30 S3:1988 (IEC 68-2-30:1980)	BS 2011 <i>Environmental testing</i> Part 2.1 <i>Tests</i> Part 2.1Db:1981 <i>Test Db and guidance: Damp heat, cyclic (12 + 12 hour cycle)</i>
HD 566 S1:1990 (IEC 85:1984)	BS 2757:1986 <i>Methods for determining the thermal classification of electrical insulation</i>
HD 553 S2:1993 (IEC 185:1987)	BS 7626:1993 <i>Specification for current transformers</i>
HD 554 S1:1992 (IEC 186:1987)	BS 7625:1993 <i>Specification for voltage transformers</i>
EN 60269-1:1989 (IEC 269-1:1986)	BS EN 60269-1:1994 <i>Low voltage fuses</i> Part 1. <i>General requirements</i>
IEC 359:1987	BS 4889:1990 <i>Methods of specifying the performance of electrical and electronic measuring equipment</i>
EN 60387:1992 (IEC 387:1992)	BS EN 60387:1993 <i>Specification for symbols for alternating current electricity meters</i>
HD 243 S12:1995 (IEC 417C:1977)	BS 6217:1981 <i>Guide to graphical symbols for use on electrical equipment</i>
EN 60514:1995 (IEC 514:1975)	BS EN 60514:1995 <i>Acceptance inspection of class 2 alternating-current watthour meters</i>
EN 60529:1991 (IEC 529:1989)	BS EN 60529:1992 <i>Degrees of protection provided by enclosures (IP code)</i>
EN 60721-3-3:1993 (IEC 721-3-3:1987)	BS EN 60721-3-3:1993 <i>Classification of environmental conditions and their severities</i> Part 3 <i>Classification of groups of environmental parameters</i> Section 3.3 <i>Stationary use at weather protected locations</i>
EN 60801-2:1993 (IEC 801-2:1991)	BS EN 60801-2:1993 <i>Electromagnetic compatibility for industrial-process measurement and control equipment</i> Part 2. <i>Electrostatic discharge requirements</i>
HD 495 S1:1987 (IEC 817:1984)	BS 7003:1988 <i>Specification for spring-operated impact-test apparatus and its calibration</i>
EN 61036:1992 (IEC 1036:1990)	BS EN 61036:1993 <i>Alternating current static watt-hour meters for active energy (classes 1 and 2)</i>
EN 55022:1994 (CISPR 22:1993)	BS EN 55022:1995 <i>Limits and methods of measurement of radio disturbance characteristics of information technology equipment</i>

The graphic signs, symbols and letters used in this standard may be found in the following British Standard.

BS 3939 Graphical symbols for electrical power, telecommunications and electronics diagrams

Part 1:1986 General information, general index

Part 2:1985 Symbol elements, qualifying symbols and other symbols having general application

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, the EN title page, pages 2 to 41, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

ICS 17.220.20

Descriptors: Var-hour meters for reactive energy, static meters, meters for alternating current, class 2, class 3

English version

Alternating current static var-hour meters for reactive energy (classes 2 and 3)

(IEC 1268:1995)

Computeurs statiques d'énergie réactive pour
courant alternatif
(classes 2 et 3)
(CEI 1268:1995)

Elektronische
Wechselstrom-Blindverbrauchsähler
(Genauigkeitsklassen 2 und 3)
(IEC 1268:1995)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 13/1069/DIS, future edition 1 of IEC 1268, prepared by IEC TC 13, Equipment for electrical energy measurement and load control, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61268 on 1995-09-20.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1996-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1996-07-01

Annexes designated “normative” are part of the body of the standard. Annexes designated “informative” are given for information only. In this standard, Annex A , Annex B , Annex C , Annex D , Annex ZA and Annex ZB are normative and Annex E and Annex F are informative. Annex ZA and Annex ZB have been added by CENELEC.

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1 Scope

This International Standard applies only to newly manufactured static var-hour meters of accuracy classes 2 and 3 for the measurement of alternating current electrical reactive energy of a frequency in the range 45 Hz to 65 Hz and, like IEC 687 and IEC 1036, it includes type tests only. The accuracy requirements for the meters of class 2 are based on IEC 1036. The values for the meters of class 3 are based on IEC 145. For practical reasons this standard is based on a conventional definition of reactive energy for sinusoidal currents and voltages containing the fundamental frequency only.

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).

It does not apply to:

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

Where the display and/or the memory(ies) is/are external or where other elements are enclosed in the meter case (such as maximum demand indicators, telemetering, time switches or remote control, etc.), this standard applies only to the metering section.

This standard does not cover the acceptance tests and the conformity tests (both testing procedures are connected with legal requirements of the different countries and could only be taken care of partially). Regarding acceptance tests, a basic guideline is given in IEC 514.

The test levels are regarded as minimum values to guarantee the proper function of the meter under normal working conditions. For special applications, other test levels might be necessary and might have to be fixed between the user and the manufacturer.

NOTE This standard is written to cover meters using both analogue and/or digital measuring techniques and phase-shifting methods where included in the meter.

This standard also covers requirements of meters, where phase-shifting is realized by appropriate external connection.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 38:1983, IEC standard voltages.

IEC 50(301, 302, 303):1983, *International Electrotechnical Vocabulary (IEV) — Chapter 301: General terms on measurements in electricity — Chapter 302: Electrical measuring instruments — Chapter 303: Electronic measuring instruments.*

IEC 60: *High-voltage test techniques.*

IEC 68-2-1:1990, *Environmental testing — Part 2: Tests — Tests A: Cold.*

IEC 68-2-2:1974, *Environmental testing — Part 2: Tests — Tests B: Dry heat.*

IEC 68-2-5:1975, *Environmental testing — Part 2: Tests — Test Sa: Simulated solar radiation at ground level.*

IEC 68-2-6:1982, *Environmental testing — Part 2: Tests — Test Fc and guidance: Vibration (sinusoidal).*

IEC 68-2-11:1981, *Environmental testing — Part 2: Tests — Test Ka: Salt mist.*

IEC 68-2-27:1987, *Environmental testing — Part 2: Tests — Test Ea and guidance: Shock.*

IEC 68-2-30:1980, *Environmental testing — Part 2: Tests — Test Db and guidance: Damp heat, cyclic (12 + 12-hour cycle).*

IEC 85:1984, *Thermal evaluation and classification of electrical insulation.*

IEC 145:1963, *Var-hour (reactive energy) meters.*

IEC 185:1987, *Current transformers*.
IEC 186:1987, *Voltage transformers*.
IEC 269-1:1986, *Low-voltage fuses — Part 1: General requirements*.
IEC 359:1987, *Expression of the performance of electrical and electronic measuring equipment*.
IEC 375:1972, *Conventions concerning electric and magnetic circuits*.
IEC 387:1992, *Symbols for alternating-current electricity meters*.
IEC 417C:1977, *Graphical symbols for use on equipment — Index, survey and compilation of the single sheets — Third supplement*.
IEC 514:1975, *Acceptance inspection of Class 2 alternating-current watt-hour meters*.
IEC 529:1989, *Degrees of protection provided by enclosures (IP Code)*.
IEC 695-2-1:1991, *Fire hazard testing — Part 2: Test methods — Section 1: Glow-wire test and guidance*.
IEC 721-3-3:1987, *Classification of environmental conditions — Part 3: Classification of groups of environmental parameters and their severities — Stationary use at weatherprotected locations*.
IEC 736:1982, *Testing equipment for electrical energy meters*.
IEC 801-2:1991, *Electromagnetic compatibility for industrial-process measurement and control equipment — Part 2: Electrostatic discharge requirements*.
IEC 801-3:1984, *Electromagnetic compatibility for industrial-process measurement and control equipment — Part 3: Radiated electromagnetic field requirements*.
IEC 801-4:1988, *Electromagnetic compatibility for industrial-process measurement and control equipment — Part 4: Electrical fast transient/burst requirements*.
IEC 817:1984, *Spring-operated impact-test apparatus and its calibration*.
IEC 1036:1990, *Alternating current static watt-hour meters for active energy (classes 1 and 2)*.
IEC/CISPR 22:1993, *Limits and methods of measurement of radio interference characteristics of information technology equipment*.
ISO 75-2:1993, *Plastics — Determination of temperature of deflection under load — Part 2: Plastic and ebonite*.

3 Definitions

For the purposes of this International Standard, the following definitions apply.

The majority of the following definitions have been taken from the relevant chapters of the International Electrotechnical Vocabulary (IEV), IEC 50(301, 302, 303). In such cases, the appropriate IEV reference is given. Certain new definitions or modifications of IEV definitions have been added in this standard in order to facilitate understanding. Expression of the performance of electrical and electronic measuring equipment has been taken from IEC 359.

3.1 General definitions

3.1.1

reactive power (var)

reactive power for sinusoidal waveforms of any single frequency in a single-phase circuit is defined as the product of the r.m.s. values of current and voltage and the sine of the phase angle between them

NOTE For practical reasons this standard applies to the reactive power for sinusoidal currents and voltages containing the fundamental frequency only.

3.1.2 Reactive energy (var-hour)

3.1.2.1

reactive energy in a single-phase circuit

the time integral of the reactive power as defined under 3.1.1

3.1.2.2**reactive energy in a polyphase circuit**

the algebraic sum of the reactive energies of the phases

NOTE As this standard is based on reactive energy derived from the sinusoidal current and voltage of fundamental frequencies, the inductive or capacitive state of a circuit in these recommendations is given by the factor “ $\sin \phi$ ”.

3.1.3**var-hour meter**

instrument intended to measure reactive energy by integrating reactive power with respect to time [IEV 301-04-18]

3.1.4**static var-hour meter**

meter in which current and voltage act on solid-state (electronic) elements to produce an output proportional to var-hours

3.1.5**multi-rate meter**

energy meter provided with a number of registers, each becoming operative at specified time intervals corresponding to different tariffs [IEV 302-04-06]

3.1.6**meter type**

term used to define a particular design of meter, manufactured by one manufacturer, having:

- a) similar metrological properties;
- b) the same uniform construction of parts determining these properties;
- c) the same ratio of the maximum current to the reference current.

the type may have several values of reference current and reference voltage

meters are designated by the manufacturer by one or more groups of letters or numbers, or a combination of letters and numbers. Each type has one designation only

NOTE The type is represented by the sample meter(s) intended for the type tests, whose characteristics (reference current and reference voltage) are chosen from the values given in the tables proposed by the manufacturer.

3.1.7**directions and sign of reactive power**

see Annex E

3.2 Definitions related to the functional elements**3.2.1****measuring element**

part of the meter which produces an output proportional to the energy

3.2.2 output devices**3.2.2.1****test output**

device which can be used for testing the meter

3.2.2.2**operation Indicator**

device which gives a visible signal of the operation of the meter

3.2.3 memory

element which stores digital information

3.2.3.1**non-volatile memory**

storage device which can retain information in the absence of power

3.2.4

display

device which displays the content(s) of (a) memory(ies)

3.2.5

register

electromechanical or electronic device comprising both memory and display which stores and displays information

a single display may be used with multiple electronic memories to form multiple registers

3.2.6

current circuit

internal connections of the meter and part of the measuring element through which flows the current of the circuit to which the meter is connected

3.2.7

voltage circuit

internal connections of the meter, part of the measuring element and power supply for the meter, supplied with the voltage of the circuit to which the meter is connected

3.2.8

auxiliary circuit

elements (lamps, contacts, etc.) and connections of an auxiliary device within the meter case intended to be connected to an external device, for example clock, relay, impulse counter

3.2.9

constant

value expressing the relation between the reactive energy registered by the meter and the corresponding value of the test output. If this value is a number of pulses, the constant should be either pulses per kilovar-hour (imp/kvarh) or var-hours per pulse (varh/imp)

3.3 Definitions of mechanical elements

3.3.1

indoor meter

meter which can only be used with additional protection against environmental influences (mounted in a house, in a cabinet)

3.3.2

outdoor meter

meter which can be used without additional protection in an exposed environment

3.3.3 base

back of the meter by which it is generally fixed and to which are attached the measuring element, the terminals or the terminal block, and the cover

for a flush-mounted meter, the meter base may include the sides of the case

3.3.3.1

socket

base with jaws to accommodate terminals of a detachable var-hour meter and which has terminals for connection to the supply line. It may be a single-position socket for one meter or a multiple-position socket for two or more meters

3.3.4

cover

enclosure on the front of the meter, made either wholly of transparent material or opaque material provided with window(s) through which the operation indicator (if fitted) and the display can be read

3.3.5

case

comprises the base and the cover

3.3.6**accessible conductive part**

conductive part which can be touched by the standard test finger, when the meter is installed ready for use

3.3.7**protective earth terminal**

terminal connected to accessible conductive parts of a meter for safety purposes

3.3.8**terminal block**

support made of insulating material on which all or some of the terminals of the meter are grouped together

3.3.9**terminal cover**

cover which covers the meter terminals and, generally, the ends of the external wires or cables connected to the terminals

3.3.10**clearance**

shortest distance measured in air between conductive parts

3.3.11**creepage distance**

shortest distance measured over the surface of insulation between conductive parts

3.4 Definitions of insulations**3.4.1****basic insulation**

insulation applied to live parts to provide basic protection against electric shock

NOTE Basic insulation does not necessarily include insulation used exclusively for functional purposes.

3.4.2**supplementary insulation**

independent insulation applied in addition to the basic insulation, in order to provide protection against electric shock in the event of a failure of the basic insulation

3.4.3**double insulation**

insulation comprising both basic insulation and supplementary insulation

3.4.4**reinforced insulation**

single insulation system applied to live parts, which provides a degree of protection against electric shock equivalent to double insulation

NOTE The term “insulation system” does not imply that the insulation should be one homogeneous piece. It may comprise several layers which cannot be tested singly as supplementary or basic insulation.

3.4.5**insulating encased meter of protective class II**

meter with a case of insulating material in which protection against electric shock does not rely on basic insulation only, but in which additional safety precautions, such as double insulation or reinforced insulation, are provided, there being no provision for protective earthing or reliance upon installation conditions