



BSI Standards Publication

Electricity metering equipment (a.c.)

Part 3: Particular requirements - Static meters for active energy (class indexes A, B and C)

National foreword

This British Standard is the UK implementation of EN 50470-3:2006+A1:2018. It supersedes BS EN 50470-3:2006, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CENELEC text carry the number of the CENELEC amendment. For example, text altered by CENELEC amendment A1 is indicated by A1 A1.

The UK participation in its preparation was entrusted to Technical Committee PEL/13, Electricity Meters.

A list of organizations represented on this committee can be obtained on request to its secretary.

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**Electricity metering equipment (a.c.)
Part 3: Particular requirements -
Static meters for active energy
(class indexes A, B and C)**

Equipement de comptage
d'électricité (c.a.)
Partie 3: Prescriptions particulières -
Compteurs statiques d'énergie active
(classes de précision A, B et C)

Wechselstrom-Elektrizitätszähler
Teil 3: Besondere Anforderungen -
Elektronische Wirkverbrauchsähler
der Genauigkeitsklassen A, B und C

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CENELEC

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Europäisches Komitee für Elektrotechnische Normung

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European foreword

This European Standard was prepared by the Technical Committee CENELEC TC 13, Equipment for electrical energy measurement and load control.

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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) 2007-05-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2009-05-01

This EN 50470-3 is related to:

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

The structure of the standards is similar, modifications in this European Standard are provided in the perspective of compliance with the Essential Requirements of the Directive 2004/22/EC on Measuring Instruments (MID).

This standard is to be used with EN 50470-1:2006, *Electricity metering equipment (a.c.) – Part 1: General requirements, tests and test conditions – Metering equipment (class indexes A, B and C)*.

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EC Directive 2004/22/EC. See Annex ZZ.

Foreword to amendment A1

This document (EN 50470-3:2006/A1:2018) was prepared by CLC/TC 13 "Electrical energy measurement and control".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2019-08-27
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2021-08-27

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For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

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1 Scope

This European Standard applies to newly manufactured static watt-hour meters intended for residential, commercial and light industrial use, of class indexes A, B and C, for the measurement of alternating current electrical active energy in 50 Hz networks. It specifies particular requirements and type test methods.

It applies to static watt-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(s) 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 (multi-function meters) then this standard applies only for the active energy metering part.

This standard distinguishes between:

- meters of class indexes A, B and C;
- direct connected and transformer operated meters;
- meters for use in networks equipped with or without earth fault neutralizers.

It does not apply to:

- watt-hour meters where the voltage across the connection terminals exceeds 600 V (line-to-line voltage for meters for polyphase systems);
- portable meters;
- reference meters.

 The safety aspect is covered by EN 62052-31:2016.

Regarding acceptance tests see EN 62058-11:2010 and EN 62058-31:2010. 

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

2 Normative references

The following referenced documents are indispensable for the application 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.

Publication	Year	Title
EN 50470-1	2006	<i>Electricity metering equipment (a.c.) – Part 1: General requirements, tests and test conditions – Metering equipment (class indexes A, B and C)</i>
 EN 50470-1:2006/A1	2018	<i>Electricity metering equipment (a.c.) – Part 1: General requirements, tests and test conditions – Metering equipment (class indexes A, B and C)</i>
EN 62052-31	2016	<i>Electricity metering equipment (AC) – General requirements, tests and test conditions – Part 31: Product safety requirements and tests (IEC 62052-31:2015)</i> 

EN 62059-41 2006 *Electricity metering equipment – Dependability – Part 41: Reliability prediction (IEC 62059-41:2006)*

3 Terms, definitions and abbreviations

For the purposes of this document, the terms and definitions given in EN 50470-1 apply.

4 Standard electrical values

The values given in EN 50470-1 apply.

5 Mechanical requirements

The requirements given in EN 50470-1 apply.

6 Climatic conditions

The conditions given in EN 50470-1 apply.

7 Electrical requirements

In addition to the electrical requirements in EN 50470-1, meters shall fulfil the following requirements.

7.1 Power consumption

7.1.1 Measurement method

The power consumption in the voltage and current circuits shall be determined at reference conditions given in 8.7.1 by any suitable method. The overall maximum error of the measurement of the power consumption shall not exceed 5 %.

7.1.2 Voltage circuits

The active and apparent power loss 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

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

7.1.3 Current circuits

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

Table 2 – Power consumption in current circuits

Meters, (single- and polyphase)	Test current	Class index		
		A	B	C
Direct connected	$I_{\text{ref}} = 10 I_{\text{tr}}$	2,5 VA	4,0 VA	4,0 VA
Transformer operated	I_n	1,0 VA	1,0 VA	1,0 VA
NOTE In order to match current transformers to meters, the meter manufacturer should state the power factor of the burden (for transformer operated meters only).				

7.2 AC voltage test

EN 62052-31:2016, 6.10.4.3.4 applies.

8 Accuracy requirements and tests

8.1 Limits of percentage error due to variation of the load

When the meter is under reference conditions given in 8.7.1, and the current and the power factor are varied, the percentage errors shall not exceed the limits specified for the relevant class indexes in Table 3 and Table 4.

If the meter is designed for the measurement of energy in both directions, the values in Table 3 and Table 4 shall apply for each direction.

**Table 3 – Percentage error limits at reference conditions
(single-phase meters and polyphase meters with balanced loads)**

Value of current for direct connected or transformer operated meters	Power factor	Percentage error limits for meters of class index		
		A	B	C
$I_{\text{min}} \leq I < I_{\text{tr}}$	1	$\pm 2,5$	$\pm 1,5$	$\pm 1,0$
$I_{\text{tr}} \leq I \leq I_{\text{max}}$	0,5 ind...1...cap 0,8	$\pm 2,0$	$\pm 1,0$	$\pm 0,5$
NOTE For the relationships $I_{\text{min}} / I_{\text{tr}}$ and $I_{\text{max}} / I_{\text{tr}}$ see EN 50470-1, Table 3.				

**Table 4 – Percentage error limits at reference conditions
(polyphase meters carrying a single-phase load,
but with balanced polyphase voltages applied to voltage circuits)**

Value of current for direct connected or transformer operated meters	Power factor	Percentage error limits for meters of class index		
		A	B	C
$I_{\text{tr}} \leq I \leq I_{\text{max}}$	0,5 ind...1	$\pm 3,0$	$\pm 2,0$	$\pm 1,0$
NOTE For the relationship $I_{\text{max}} / I_{\text{tr}}$ see EN 50470-1, Table 3.				

The difference between the percentage error when the meter is carrying a single-phase load and a balanced polyphase load at I_{ref} and unity power factor shall not exceed 2,5 %, 1,5 % and 1 % for class indexes A, B and C respectively.

8.2 Repeatability

The application of the same measurand under the same conditions of measurement shall result in the close agreement of successive measurements. The repeatability at any test point given in Table 12 shall be better than $1/10^{\text{th}}$ of the limit of percentage error at reference conditions. The manufacturer shall state the necessary number of pulses.

8.3 Limits of additional percentage error due to influence quantities

When the current and the power factor are held constant at a point within their respective specified measuring ranges, and any single influence quantity is taken from its reference value and varied within its specified operating range, with the meter otherwise operated at reference conditions as specified in 8.7.1, the additional percentage error shall not exceed the limits specified for the relevant class indexes given in Table 5 and Table 6.

Concerning additional percentage error due to temperature variation, the requirements for each sub-range within the full temperature range specified by the manufacturer apply.

NOTE For example, if the manufacturer specifies that the meter is intended for the temperature range -10 °C to $+40\text{ °C}$, then the requirements for the sub-ranges 5 °C to 30 °C , -10 °C to 5 °C and 30 °C to 40 °C apply.

**Table 5 – Limits of additional percentage error due to influence quantities
(single-phase meters and polyphase meters with balanced loads)**

Influence quantity	Value of current for direct connected or transformer operated meters	Power factor	Limits of additional percentage error for meters of class index		
			A	B	C
Temperature variation					
5 °C to 30 °C	$I_{\min} \leq I \leq I_{\max}$	1	$\pm 1,8$	$\pm 0,9$	$\pm 0,5$
	$I_{\text{tr}} \leq I \leq I_{\max}$	0,5 ind, 0,8 cap	$\pm 2,7$	$\pm 1,3$	$\pm 0,9$
-10 °C to 5 °C 30 °C to 40 °C	$I_{\min} \leq I \leq I_{\max}$	1	$\pm 3,3$	$\pm 1,6$	$\pm 1,0$
	$I_{\text{tr}} \leq I \leq I_{\max}$	0,5 ind, 0,8 cap	$\pm 4,9$	$\pm 2,3$	$\pm 1,6$
-25 °C to -10 °C 40 °C to 55 °C	$I_{\min} \leq I \leq I_{\max}$	1	$\pm 4,8$	$\pm 2,4$	$\pm 1,4$
	$I_{\text{tr}} \leq I \leq I_{\max}$	0,5 ind, 0,8 cap	$\pm 7,2$	$\pm 3,4$	$\pm 2,4$
-40 °C to -25 °C 55 °C to 70 °C	$I_{\min} \leq I \leq I_{\max}$	1	$\pm 6,3$	$\pm 3,1$	$\pm 1,9$
	$I_{\text{tr}} \leq I \leq I_{\max}$	0,5 ind, 0,8 cap	$\pm 9,4$	$\pm 4,4$	$\pm 3,1$
Voltage variation $\pm 10\%$	$I_{\min} \leq I \leq I_{\max}$	1	$\pm 1,0$	$\pm 0,7$	$\pm 0,2$
	$I_{\text{tr}} \leq I \leq I_{\max}$	0,5 ind, 0,8 cap	$\pm 1,5$	$\pm 1,0$	$\pm 0,4$
Frequency variation $\pm 2\%$	$I_{\min} \leq I \leq I_{\max}$	1	$\pm 0,8$	$\pm 0,5$	$\pm 0,2$
	$I_{\text{tr}} \leq I \leq I_{\max}$	0,5 ind, 0,8 cap	$\pm 1,0$	$\pm 0,7$	$\pm 0,2$
NOTE For the relationships $I_{\min} / I_{\text{tr}}$ and $I_{\max} / I_{\text{tr}}$ see EN 50470-1, Table 3.					