

Direct acting indicating analogue electrical measuring instruments and their accessories —

Part 6: Specification for special requirements for ohmmeters (impedance meters) and conductance meters

This European Standard EN 60051-6 has the status of a
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Cooperating organizations

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National foreword

This British Standard has been prepared under the direction of the Power Electrical Engineering Standards Policy Committee and is the English language version of EN 60051-6 “*Direct acting indicating analogue electrical measuring instruments and their accessories — Part 6: Special requirements for ohmmeters (impedance meters) and conductance meters*”, published by the European Committee for Electrotechnical Standardization (CENELEC). It is identical with IEC publication 51-6 published by the International Electrotechnical Commission (IEC).

This Part of BS 89 together with Parts 1, 2, 3, 4, 5, 7, 8 and 9 of this Standard supersedes BS 89:1977, which is withdrawn. BS 89 comprises the following Parts, which will be the English language version of the listed European Standards.

European Standard	Corresponding Part of BS 89
EN 60051-1	Part 1 <i>Specification for definitions and general requirements common to all Parts</i>
EN 60051-2	Part 2 <i>Specification for special requirements for ammeters and voltmeters</i>
EN 60051-3	Part 3 <i>Specification for special requirements for wattmeters and varmeters</i>
EN 60051-4	Part 4 <i>Specification for special requirements for frequency meters</i>
EN 60051-5	Part 5 <i>Specification for special requirements for phase meters, power factor meters and synchrosopes</i>
EN 60051-6	Part 6 <i>Specification for special requirements for ohmmeters (impedance meters) and conductance meters</i>
EN 60051-7	Part 7 <i>Specification for special requirements for multi-function instruments</i>
EN 60051-8	Part 8 <i>Specification for special requirements for accessories</i>
EN 60051-9	Part 9 <i>Recommended test methods</i>

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 8, 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.

EUROPEAN STANDARD

EN 60051-5

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 1989

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Key words: Electrical measuring instruments; analogue indicating instruments; direct acting measuring instruments; accessories for electrical measuring instruments; ohmmeters; impedance meters; conductance meters

English version

Direct acting indicating analogue electrical measuring instruments and their accessories
Part 6: Special requirements for ohmmeters (impedance meters) and conductance meters

(IEC 51-6:1984: edition 4)

Appareils mesureurs électriques indicateurs analogues à action directe et leurs accessoires
Sixième partie: Prescriptions particulières pour les ohmmètres (les impédancemètres) et les conductancemètres
(CEI 51-6:1984: édition 4)

Direkt wirkende anzeigende elektrische Meßgeräte und ihr Zubehör Meßgeräte mit Skalenanzeige
Teil 6: Spezielle Anforderungen für Widerstands — (Scheinwiderstands -) und Leitfähigkeits-Meßgeräte
(IEC 51-6:1984: Ausgabe 4)

This European Standard was ratified by CENELEC on 11 September 1989. CENELEC members are bound to comply with the requirements of the CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CENELEC Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French and German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to CENELEC Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B-1050 Brussels

Brief history

The text of IEC-Publication 51-6 (4th edition — 1984) was submitted to the CENELEC members for unique acceptance.

Technical text

The text of the International Standard IEC 51-6 (4th edition — 1984) was approved by CENELEC on 11 September 1989 as a European Standard.

The following dates are applicable:

- latest date of announcement of the EN at national level (doa) : 1990-03-01
- date of latest publication of a new harmonized standard (dop) : 1990-09-01
- date of withdrawal of conflicting national standards (dow) : 1990-09-01

Foreword

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

Preface

This standard has been prepared by IEC Technical Committee No. 85: Measuring Equipment for Basic Electrical Quantities (former Sub-Committee 13B: Electrical Measuring Instruments).

This fourth edition replaces the third edition of IEC Publication 51.

This standard constitutes Part 6.

The general layout for the revised Publication 51 is as follows:

- *Part 1: Definitions and General Requirements Common to all Parts;*
- *Part 2: Special Requirements for Ammeters and Voltmeters;*
- *Part 3: Special Requirements for Wattmeters and Varmeters;*
- *Part 4: Special Requirements for Frequency Meters;*
- *Part 5: Special Requirements for Phase Meters, Power Factor Meters and Synchrosopes;*
- *Part 6: Special Requirements for Ohmmeters (Impedance Meters) and Conductance Meters;*
- *Part 7: Special Requirements for Multi-function Instruments;*
- *Part 8: Special Requirements for Accessories;*
- *Part 9: Recommended Test Methods.*

Parts 2 to 9 are not complete in themselves and shall be read in conjunction with Part 1.

All of these parts are arranged in the same format and a standard relationship between subject and clause number is maintained throughout. In addition, tables, figures and appendices add a suffix to the part number in order to differentiate the parts. This re-arrangement will assist the reader of IEC Publication 51 to distinguish information relating to the different types of instruments.

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

Six Months' Rule	Report on Voting
13B(CO)89	13B(CO)98

Further information can be found in the Report on Voting indicated in the table above.

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1 Scope

1.1 to 1.8 See Part 1.

1.9 Part 6 of the standard does not apply to resistivity meters (specific resistance meters), insulation resistance meters used in energized circuits or conductivity meters (specific conductance meters).

2 Definitions

See Part 1.

3 Description, classification and compliance

3.1 Description

Ohmmeters shall be described:

3.1.1 According to their method of operation as given in Sub-clause 2.2 of Part 1.

3.1.2 According to whether they measure resistance values by a two-terminal or a four-terminal method.

3.1.3 According to whether they have a linear scale or a non-linear scale.

3.2 Classification

Ohmmeters shall be classified in one of the accuracy classes denoted by the following class indices:

0.05, 0.1, 0.2, 0.5, 1, 1.5, 2, 2.5, 3, 5, 10, 20.

3.3 Compliance with the requirements of this standard

3.3.1 and 3.3.2 See Part 1.

3.3.3 For impedance meters and for instruments not scaled in units of resistance or conductance, the manufacturer's instructions shall be followed.

4 Reference conditions and intrinsic errors

4.1 Reference conditions

4.1.1 to 4.1.3 See Part 1.

4.1.4 The requirements of Table I-1 concerning ripple, distortion, peak-factor and frequency do not apply to ohmmeters.

4.2 Limits of intrinsic error: fiducial value

See Part 1.

4.2.1 Correspondance between intrinsic error and accuracy class

See Part 1.

4.2.2 Fiducial value

The fiducial value for an ohmmeter corresponds to:

4.2.2.1 The indicated value for non-linear scale ohmmeters.

The class index is marked using Symbol E-3 given in Table III-1 (see Part 1, Clause 8).

4.2.2.2 The span for linear scale ohmmeters.

The class index is marked using Symbol E-10 given in Table III-1 (see Part 1, Clause 8).

4.3 Rated values

4.3.1 When a rated voltage is stated, the open circuit voltage at the measuring terminals shall not differ from the rated voltage by more than 10 % of the rated voltage.

4.3.2 When a rated voltage across a given value of test resistance is stated, the voltage shall not differ from the rated voltage by more than 10 % of the rated voltage.

4.3.3 When a maximum (or a minimum) value is stated, it shall not exceed (or be less than) the stated voltage at any permissible supply voltage and at any setting of the controls and adjustments which are accessible to the user.

4.3.4 When a rated, maximum or minimum current is stated, the requirements of Sub-clauses 4.3.1 to 4.3.3 shall apply, substituting current for voltage.

5 Nominal range of use and variations

5.1 Nominal range of use

5.1.1 and 5.1.2 See Part 1.

5.1.3 The requirements of Table II-1 concerning ripple, distortion, peak-factor and frequency do not apply to ohmmeters.

5.2 Limits of variations

See Part 1.

5.2.1 to 5.2.4 See Part 1.

5.2.5 Ohmmeters which employ batteries shall operate correctly with the batteries having any value of voltage and internal resistance within the ranges stated by the manufacturer. When the preliminary adjustments specified by the manufacturer have been carried out, any variations caused by changes of the battery characteristics shall not cause the instrument to indicate outside its accuracy class.

5.3 Conditions for the determination of variations

5.3.1 and 5.3.2 See Part 1.

5.3.3 The variations of ohmmeters intended for intermittent use shall be determined immediately after pre-conditioning, if any.

6 Further electrical and mechanical requirements

6.1 Voltage tests, insulation tests and other safety requirements

See Part 1.

6.2 Damping

The requirements of Part 1 do not apply to ohmmeters.

6.3 Self-heating

For the recommended test, see Part 9, Sub-clause 4.14.

6.3.1 to 6.3.3 The requirements of Part 1 do not apply to ohmmeters.

6.3.4 See Part 1.

6.3.5 Ohmmeters intended for continuous use shall comply with their accuracy requirements after being connected to an open circuit for any time after the completion of the specified pre-conditioning period, if any.

They shall similarly comply with their accuracy requirements after being connected to a short circuit.

6.3.6 The requirements of Sub-clause **6.3.5** also apply to ohmmeters intended for intermittent use except that the time after connection shall be up to 30 s for ohmmeters having hand-driven rotary generators and up to 5 min for all other ohmmeters intended for intermittent use.

6.4 Permissible overloads

The requirements of Part 1 do not apply to ohmmeters.

6.5 Limiting values of temperature

See Part 1.

6.6 Deviation from zero

There are no requirements relating to deviation from zero for ohmmeters.

7 Constructional requirements

7.1 Sealing to prevent access

See Part 1.

7.2 Scales

7.2.1 and **7.2.2** See Part 1.

7.2.3 Direction of deflection

The direction of deflection for ohmmeters is not specified.

7.2.4 Limits of the measuring range

7.2.4.1 to **7.2.4.3** See Part 1.

7.2.4.4 For ohmmeters with non-linear scales, the method of identifying the limits of the measuring range by the omission of subdivisions outside the measuring range (Figure 1-1) shall not be used.

7.2.4.5 The measuring range shall correspond to at least 50 % of the scale length.

7.3 Preferred values

To be agreed between manufacturer and user.

7.4 Adjuster(s), mechanical and/or electrical

See Part 1.

7.5 Effects of vibration and shock

See Part 1.

8 Information, general markings and symbols

8.1 Information

See Part 1.

8.1.1 The open-circuit voltage or the voltage across a test resistance of given value and the short-circuit current are rated values and shall be stated as required by Item e) of Sub-clause **8.1** in Part 1.

8.2 and **8.3** See Part 1.

9 Markings and symbols for terminals

9.1 to **9.3** See Part 1.

9.4 Special markings for terminals

9.4.1 Single-function two-terminal ohmmeters shall have the terminal which, when in use, is positive relative to the other terminal, marked with Symbol F-46 (+).

9.4.2 Single-function four-terminal ohmmeters shall have the current terminal which, when in use, is positive relative to the other current terminal, marked with Symbol F-46 (+).

9.4.3 The requirements of Sub-clauses **9.4.1** and **9.4.2** need not apply to multi-function instruments where other uses of the terminals may require different markings.

9.4.4 Ohmmeters having (an) accessory(ies)

The terminals intended to be connected to an external measuring circuit shall be marked in accordance with Sub-clauses **9.4.1** to **9.4.3**. The terminal(s) on the ohmmeter which is intended to be connected to (a) terminal(s) on the accessory(ies) shall be marked with an arabic numeral(s).

The manufacturer may select any convenient and non-conflicting numeral(s). Pairs of terminals which are intended to be connected together shall carry the same numeral.

10 Tests to prove compliance with this standard

See Part 1 and Appendix A-6.

Appendix A-6 Tests

A-6 1 Suggestions for routine tests

Test for intrinsic error for resistance measurement (Clause 4).

Test for rated, maximum or minimum voltage or current (Clause 4).

Test for variation due to position (Clause 5, Table II-1).

Voltage test (Sub-clause 6.1).

National appendix W

The United Kingdom participation in the preparation of this European Standard was entrusted by the Power Electrical Engineering Standards Policy Committee (PEL/-) to Technical Committee PEL/13 upon which the following bodies were represented:

Association of Consulting Engineers
Association of Supervisory and Executive Engineers
Department of Energy (Electricity Division)
Department of Trade and Industry (National Physical Laboratory)
Department of Trade and Industry (National Measurement Accreditation Service)
Electrical Power Engineers' Association
Electricity Supply Industry in England and Wales
Engineering Teaching Equipment Manufacturers' Association
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General Electric Company Limited
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BS 89-6:1990
EN 60051-6:
1989
IEC 51-6:1984

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