



BSI Standards Publication

Safety requirements for electrical equipment for measurement, control, and laboratory use

Part 2-033: Particular requirements for hand-held multimeters and other meters for domestic and professional use, capable of measuring mains voltage

National foreword

This British Standard is the UK implementation of EN IEC 61010-2-033:2021/A11:2021. It is derived from IEC 61010-2-033:2021. It supersedes BS EN 61010-2-033:2012, which will be withdrawn on 12 November 2024.

The text of CENELEC amendment A11:2021 has been provided in its entirety at the end of this document. BSI's policy of providing consolidated content remains unchanged; however, in the interest of expediency, in this instance BSI have chosen to collate the relevant content at the end of this document.

The UK participation in its preparation was entrusted to Technical Committee EPL/66, Safety of measuring, control and laboratory equipment.

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

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Date	Text affected
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EUROPEAN STANDARD

EN IEC 61010-2-033

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2021

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Supersedes EN 61010-2-033:2012 and all of its
amendments and corrigenda (if any)

English Version

**Safety requirements for electrical equipment for measurement,
control, and laboratory use - Part 2-033: Particular requirements
for hand-held multimeters for domestic and professional use,
capable of measuring mains voltage
(IEC 61010-2-033:2019)**

Exigences de sécurité pour appareils électriques de
mesurage, de régulation et de laboratoire - Partie 2-033:
Exigences particulières pour les multimètres portatifs pour
usage domestique et professionnel, capables de mesurer la
tension réseau
(IEC 61010-2-033:2019)

Sicherheitsbestimmungen für elektrische Mess-, Steuer-,
Regel- und Laborgeräte - Teil 2-033: Besondere
Anforderungen an handgehaltene Multimeter und andere
handgehaltene Messgeräte für den Haushalt und
professionellen Gebrauch, geeignet zur Messung von
Netzspannungen
(IEC 61010-2-033:2019)

This European Standard was approved by CENELEC on 2019-07-26. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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

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European foreword

The text of document 66/692/FDIS, future edition 2 of IEC 61010-2-033, prepared by IEC/TC 66 "Safety of measuring, control and laboratory equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61010-2-033:2021.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2022-05-12
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2024-11-12

This document supersedes EN 61010-2-033:2012 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a Standardization Request given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

For the relationship with EU Directive(s) / Regulation(s), see informative Annex ZZ, which is an integral part of EN IEC 61010-2-033:2021/A11:2021.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 61010-2-033:2019 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61010-2-034	NOTE	Harmonized as EN IEC 61010-2-034
IEC 61557-1	NOTE	Harmonized as EN 61557-1
IEC 61557-2	NOTE	Harmonized as EN 61557-2
IEC 61557-3	NOTE	Harmonized as EN 61557-3
IEC 61557-4	NOTE	Harmonized as EN 61557-4
IEC 61557-5	NOTE	Harmonized as EN 61557-5
IEC 61557-6	NOTE	Harmonized as EN 61557-6
IEC 61557-7	NOTE	Harmonized as EN 61557-7
IEC 61557-8	NOTE	Harmonized as EN 61557-8

IEC 61557-9	NOTE	Harmonized as EN 61557-9
IEC 61557-10	NOTE	Harmonized as EN 61557-10
IEC 61557-11	NOTE	Harmonized as EN 61557-11
IEC 61557-12	NOTE	Harmonized as EN 61557-12

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INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Safety requirements for electrical equipment for measurement, control
and laboratory use –**

**Part 2-033: Particular requirements for hand-held multimeters for domestic
and professional use, capable of measuring MAINS voltage**

**Exigences de sécurité pour appareils électriques de mesurage, de régulation
et de laboratoire –**

**Partie 2-033: Exigences particulières pour les multimètres portatifs pour usage
domestique et professionnel, capables de mesurer la tension RESEAU**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT
FOR MEASUREMENT, CONTROL, AND LABORATORY USE –****Part 2-033: Particular requirements for hand-held multimeters
for domestic and professional use, capable of measuring MAINS voltage**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61010-2-033 has been prepared by IEC technical committee 66: Safety of measuring, control and laboratory equipment.

This second edition cancels and replaces the first edition published in 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) The scope has been reduced to hand-held multimeters. Voltmeters and clamp multimeters have been removed. They are addressed respectively by IEC 61010-2-030 and IEC 61010-2-032. The relevant definitions have been removed.
- b) Subclause 4.4.2.101 has been relocated into Clause 102.

- c) CLEARANCES and CREEPAGE DISTANCES for WET LOCATIONS and for measuring circuit TERMINALS exceeding 1 000 V a.c. or 1 414 V d.c. have been specified.
- d) Subclause 14.101 related to "Circuits or components used as TRANSIENT OVERVOLTAGE limiting devices in measuring circuits used to measure MAINS" has been removed.
- e) References to IEC 61010-031 for probe assemblies and IEC 61010-2-032 for current sensors have been added.
- f) Requirements for protection against MAINS overvoltage measuring circuits have been added.
- g) Clause 102 has been rewritten.
- h) Requirements for measuring circuits from 1 000 V to 3 000 V have been added.
- i) An informative Annex CC about dimensions of 4-mm banana TERMINALS has been added.
- j) A flowchart for insulation according to the type of circuit has been added in a new Annex DD.

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

FDIS	Report on voting
66/692/FDIS	66/694/RVD

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

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

A list of all the parts in the IEC 61010 series, published under the general title *Safety requirements for electrical equipment for measurement, control, and laboratory use*, can be found on the IEC website.

This Part 2-033 is to be used in conjunction with the latest edition of IEC 61010-1. It was established on the basis of the third edition (2010) of IEC 61010-1 and its Amendment 1 (2016), hereinafter referred to as Part 1.

This Part 2-033 supplements or modifies the corresponding clauses in IEC 61010-1 so as to convert that publication into the IEC standard: *Particular requirements for hand-held multimeters for domestic and professional use, capable of measuring MAINS voltage*.

Where a particular subclause of Part 1 is not mentioned in this Part 2-033, that subclause applies as far as is reasonable. Where this Part 2-033 states "addition", "modification", "replacement", or "deletion", the relevant requirement, test specification or note in Part 1 should be adapted accordingly.

In this standard:

- a) the following print types are used:
 - requirements: in roman type;
 - NOTES: in small roman type;
 - *conformity and tests: in italic type*;
 - terms used throughout this standard which have been defined in Clause 3: SMALL ROMAN CAPITALS;
- b) subclauses, figures, tables and notes which are additional to those in Part 1 are numbered starting from 101. Additional annexes are lettered starting from AA and additional list items are lettered from aa).

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

Part 2-030 specifies the safety requirements for equipment with testing and measuring circuits which are connected for test or measurement purposes to devices or circuits outside the measurement equipment itself. Requirements of Part 2-030 have been included in this Part 2-033. Equipment within the scopes of both Part 2-030 and Part 2-033 are considered to be covered by the requirements of this Part 2-033.

Part 2-032 specifies the safety requirements for hand-held and hand-manipulated current sensors. For equipment within the scope of Part 2-032 and Part 2-033, only Part 2-032 is applicable.

Part 2-034 specifies the safety requirements for measurement equipment for insulation resistance and test equipment for electric strength which are connected to units, lines or circuits for test or measurement purposes. For equipment within the scope of Part 2-033 and Part 2-034, only Part 2-034 is applicable.

SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE –

Part 2-033: Particular requirements for hand-held multimeters for domestic and professional use, capable of measuring MAINS voltage

1 Scope and object

This clause of Part 1 is applicable except as follows:

1.1.1 Equipment included in scope

Replace the existing text with the following:

This part of IEC 61010 specifies safety requirements for hand-held multimeters for domestic and professional use, capable of measuring MAINS.

Hand-held multimeters are multi-range multifunction measuring instruments intended to measure voltage and other electrical quantities such as resistance or current. Their primary purpose is to measure voltage on a live MAINS. They are suitable to be supported by one hand during NORMAL USE.

1.1.2 Equipment excluded from scope

Add the following new item to the list and the following paragraph:

- aa) IEC 61557-1 to IEC 61557-12, *Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures*

HAND-HELD EQUIPMENT such as oscilloscopes, wattmeters, process control multimeters not RATED for measuring voltage on a live MAINS, clamp multimeters and communications test sets are not within the scope of this document.

1.2.1 Aspects included in scope

Add the following two new paragraphs at the end of the subclause:

Requirements for protection against HAZARDS resulting from NORMAL USE and REASONABLY FORESEEABLE MISUSE of measuring circuits are given in Clause 101.

Requirements for reliance on the displayed value are given in Clause 102.

2 Normative references

This clause of Part 1 is applicable except as follows:

Replace "IEC 61010-031" with the following new reference:

IEC 61010-031:2015, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 031: Safety requirements for hand-held and hand-manipulated probe assemblies for electrical test and measurement*
IEC 61010-031:2015/AMD1:2018

Replace "IEC 61180-1 (all parts)", "IEC 61180-1" and "IEC 61180-2", with the following new reference:

IEC 61180, High-voltage test techniques for low-voltage equipment – Definitions, test and procedure requirements, test equipment

Add the following new normative reference:

IEC 61010-2-032, Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 2-032: Particular requirements for hand-held and hand-manipulated current sensors for electrical test and measurement

3 Terms and definitions

This clause of Part 1 is applicable except as follows:

3.5 Safety terms

Replace the definition of 3.5.4 with the following new definition:

3.5.4

MAINS

electricity supply system

Add the following new term and definition:

3.5.101

MEASUREMENT CATEGORY

classification of testing and measuring circuits according to the type of MAINS to which they are intended to be connected

Note 1 to entry: MEASUREMENT CATEGORIES take into account OVERVOLTAGE CATEGORIES, short-circuit current levels, the location in the building installation where the test or measurement is to be made, and some forms of energy limitation or transient protection included in the building installation. See Annex AA for more information.

4 Tests

This clause of Part 1 is applicable, except as follows:

4.3.2.5 MAINS supply

Replace the existing title and the text with:

4.3.2.5 Power supply

The following requirements apply.

- a) The MAINS supply voltage shall be between 90 % and 110 % of any RATED supply voltage for which the equipment can be set or, if the equipment is RATED for a greater fluctuation, at any supply voltage within the fluctuation range.
- b) The MAINS frequency shall be any RATED frequency.
- c) Equipment for both a.c. and d.c. shall be connected to an a.c. or d.c. supply.
- d) Equipment powered by single-phase a.c. MAINS supply shall be connected both with normal and reverse polarity.
- e) If the means of connection permits reversal, battery-operated and d.c. equipment shall be connected with both reverse and normal polarity.

4.3.2.6 Input and output voltages

Replace the first paragraph with the following:

Input and output voltages, including floating voltages but excluding the MAINS supply voltage, shall be set to any voltage within the RATED voltage range, in normal and reverse polarity if possible.

5 Marking and documentation

This clause of Part 1 is applicable except as follows:

5.1.2 Identification

Add the following note after the existing note:

NOTE 101 Some national regulations might require a marking to indicate the name and edition of the standard used for compliance evaluation.

5.1.5 TERMINALS, connections, and operating devices

5.1.5.1 General

Replace the first paragraph with the following:

If necessary for safety, an indication shall be given of the purpose of TERMINALS, connectors, controls, and indicators. Where there is insufficient space, symbol 14 from Table 1 may be used.

5.1.5.2 TERMINALS

Replace the existing item d) with the following item d):

- d) TERMINALS supplied from the interior of the hand-held multimeter and which could be HAZARDOUS LIVE, with the voltage, current, charge or energy value or range, or with symbol 12 of Table 1;

Add the following new item to the list:

- aa) TERMINALS supplied from other TERMINALS which could be HAZARDOUS LIVE, with symbol 12 or 14 of Table 1.

Add the following new subclause:

5.1.5.101 Measuring circuit TERMINALS

Measuring circuit TERMINALS shall be marked with the value of the RATED voltage to earth.

Each pair or set of measuring circuit TERMINALS that are intended to be used together shall be marked with the value of the RATED voltage or the RATED current as applicable to the pair or set of TERMINALS.

Measuring circuit TERMINALS are usually arranged in pairs or sets. Each pair or set of TERMINALS may have a RATED voltage or a RATED current, or both, within that set, and each individual TERMINAL will have a RATED voltage to earth. For some hand-held multimeters, the RATED voltage between TERMINALS may be different from the RATED voltage to earth. Markings shall be clear to avoid misunderstanding.