



UL 61010-031

STANDARD FOR SAFETY

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

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UL Standard for 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, UL 61010-031

Second Edition, Dated January 27, 2017

Summary of Topics

This revision of ANSI/UL 61010-031, dated January 7, 2020 includes the following changes in requirements:

Revision to remove existing national deviation clause 8.4DV.

Revision to the national deviations in the Normative Reference.

Adoption of IEC 61010-031 Edition 2.1 issued 2018-05 Amendment 1 which included a title change.

UL 61010-031 is an adoption of IEC 61010-031, 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, second edition (issued May 2015) and its amendment 1 (issued May 2018). Please note that the National Difference document incorporates all of the US National Differences for UL 61010-031.

As noted in the Commitment for Amendments statement located on the back side of the title page, UL and CSA are committed to updating this bi-national standard jointly.

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated August 16, 2019.

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Second Edition
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Underwriters Laboratories Inc.
UL 61010-031
Second Edition

**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**

January 27, 2017

(Title Page Reprinted January 7, 2020)

This national standard is based on publication IEC 61010-031, second edition (2015-05) and Amendment 1 (2018-05).



ANSI/UL 61010-031-2020



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This ANSI/UL Standard for Safety consists of the Second edition including revisions through January 7, 2020. The most recent designation of ANSI/UL 61010-031 as an American National Standard (ANSI) occurred on January 7, 2020. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards.

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PREFACE

This is the harmonized CSA Group and UL standard for *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*. It is the second edition of CAN/CSA-C22.2 No. 61010-031 and the second edition of UL 61010-031. This edition of CAN/CSA-C22.2 No. 61010-031 supersedes the previous edition published on March 30, 2007. This edition of UL 61010-031 supersedes the previous edition published on March 30, 2007. This harmonized standard has been jointly revised on January 7, 2020. For this purpose, CSA Group and UL are issuing revision pages dated January 20, 2020.

This harmonized standard is based on IEC Publication 61010-031: second edition, *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*, issued May 2015, as revised by Amendment 1 issued May 2018. IEC 61010-031 is copyrighted by the IEC.

This standard is considered suitable for use for conformity assessment within the stated scope of the standard.

This standard was reviewed by the CSA Subcommittee on Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, under the jurisdiction of the CSA Technical Committee on Consumer and Commercial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee. This standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

Application of Standard

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

Note: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

Level of Harmonization

This standard adopts the IEC text with national differences.

This standard is published as an identical standard for CSA Group and UL.

An identical standard is a standard that is exactly the same in technical content except for national differences resulting from conflicts in codes and governmental regulations. Presentation is word for word except for editorial changes.

All national differences from the IEC text are included in the CSA Group and UL versions of the standard. While the technical content is the same in each organization's version, the format and presentation may differ.

Reasons for Differences from IEC

National Differences from the IEC are being added in order to address safety and regulatory situations present in the US and Canada.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

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These materials are subject to copyright claims of IEC and UL. No part of this publication may be reproduced in any form, including an electronic retrieval system, without the prior written permission of UL. All requests pertaining to the 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 UL 61010-031 Standard should be submitted to UL.

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NATIONAL DIFFERENCES

In the CSA Group and UL publications of this standard, National Differences from the text of International Electrotechnical Commission (IEC) Publication 61010-031, 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, copyright 2015 including Amendment 1, 2018, are indicated by notations (differences) and are presented in bold text. The national difference type is included in the body.

There are five types of National Differences as noted below. The difference type is noted on the first line of the National Difference in the standard. The standard may not include all types of these National Differences.

DR – These are National Differences based on the **national regulatory requirements**.

D1 – These are National Differences which are based on **basic safety principles and requirements**, elimination of which would compromise safety for consumers and users of products.

D2 – These are National Differences from IEC requirements based on existing **safety practices**. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.

DC – These are National Differences based on the **component standards** and will not be deleted until a particular component standard is harmonized with the IEC component standard.

DE – These are National Differences based on **editorial comments or corrections**.

Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

Addition / Add - An addition entails adding a complete new numbered clause, subclause, table, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

Modification / Modify - A modification is an altering of the existing base IEC text such as the addition, replacement or deletion of certain words or the replacement of an entire clause, subclause, table, figure, or annex of the base IEC text.

Deletion / Delete - A deletion entails complete deletion of an entire numbered clause, subclause, table, figure, or annex without any replacement text.

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FOREWORD

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

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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6) All users should ensure that they have the latest edition of this publication.

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8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

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

International Standard IEC 61010-031 has been prepared by IEC technical committee 66: Safety of measuring, control and laboratory equipment.

It has the status of a group safety publication in accordance with IEC GUIDE 104.

IEC 61010-031 is a stand-alone standard. This second edition cancels and replaces the first edition published in 2002 and Amendment 1:2008. This edition constitutes a technical revision.

This edition includes the following significant changes from the first edition, as well as numerous other changes:

a) Voltages above the levels of 30 V r.m.s., 42,4 V peak, or 60 V d.c. are deemed to be HAZARDOUS LIVE instead of 33 V r.m.s., 46,7 V peak, or 70 V d.c.

- b) Servicing is now included within the scope.
- c) Extended environmental conditions are included within the scope.
- d) New terms have been defined.
- e) Tests for REASONABLY FORESEEABLE MISUSE have been added, in particular for fuses.
- f) Additional instruction requirements for probe assembly operation have been specified.
- g) Limit values for ACCESSIBLE parts and for measurement of voltage and touch current have been modified.
- h) SPACINGS requirements for mating of CONNECTORS have been modified.
- i) PROBE TIPS and SPRING-LOADED CLIPS requirements have been modified. The PROTECTIVE FINGERGUARD replace the BARRIER with new requirements.
- j) Insulation requirements (6.5) and test procedures (6.6.5) have been rewritten and aligned when relevant with Part 1. Specific requirements have been added for solid insulation and thin-film insulation.
- k) The terminology for MEASUREMENT CATEGORY I has been replaced with the designation “not RATED for measurements within MEASUREMENT CATEGORIES II, III, or IV”.
- l) The flexing/pull test (6.7.4.3) has been partially rewritten.
- m) Surface temperature limits (Clause 10) have been modified to conform to the limits of IEC Guide 117.
- n) Requirements for resistance of PROBE WIRES to mechanical stresses have been added in Clause 12 and a new Annex D.
- o) Requirements have been added regarding the prevention of HAZARD from arc flash and short-circuits for SPRING-LOADED CLIPS.
- p) A new informative Annex E defines the dimension of the 4 mm banana CONNECTORS.

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

FDIS	Report on voting
66/569/FDIS	66/571/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 the IEC 61010 series, under the general title, *Safety requirements for electrical equipment for measurement, control, and laboratory use*, may be found on the IEC website.

In this standard, the following print types are used:

- requirements and definitions: in roman type;
- NOTES and EXAMPLES: in smaller roman type;
- *conformity and tests*: in italic type;
- terms used throughout this standard which have been defined in Clause [3](#): SMALL ROMAN CAPITALS.

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.

1DV DE Addition:

Add the following to the end of the IEC Foreword:

The numbering system in the standard uses a space instead of a comma to indicate thousands and uses a comma instead of a period to indicate a decimal point. For example, 1 000 means 1,000 and 1,01 means 1.01.

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.

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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

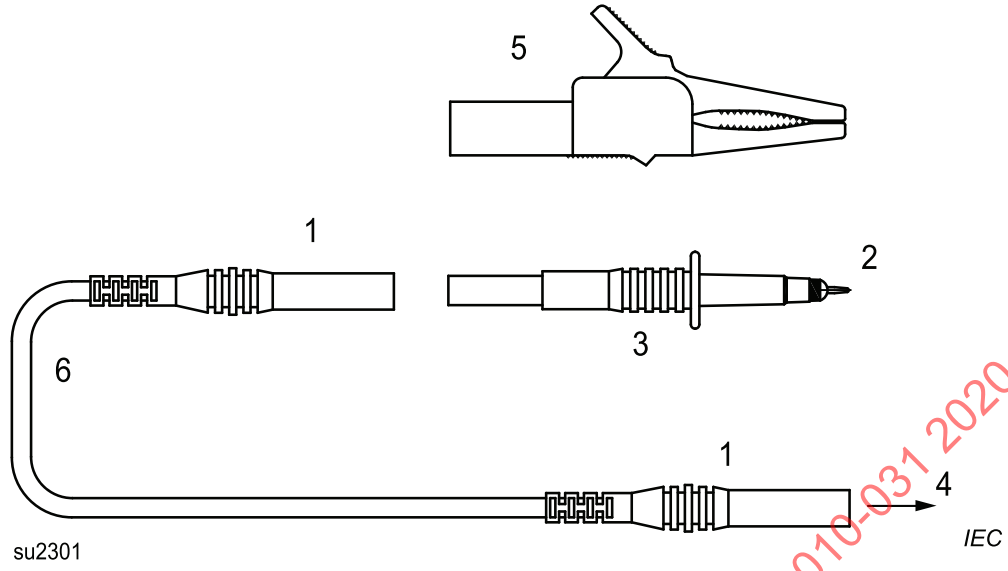
1 Scope and object

1.1 Scope

1.1.1 Probe assemblies included in scope

This part of IEC 61010 specifies safety requirements for hand-held and hand-manipulated probe assemblies of the types described below, and their related accessories. These probe assemblies are for direct electrical connection between a part and electrical test and measurement equipment. They may be fixed to the equipment or be detachable accessories for the equipment.

- a) Type A: low-voltage and high-voltage, non-attenuating probe assemblies. Non-attenuating probe assemblies that are RATED for direct connection to voltages exceeding 30 V r.m.s., 42,4 V peak, or 60 V d.c., but not exceeding 63 kV. They do not incorporate components which are intended to provide a voltage divider function or a signal conditioning function, but they may contain non-attenuating components such as fuses (see [Figure 1](#)).
- b) Type B: high-voltage attenuating or divider probe assemblies. Attenuating or divider probe assemblies that are RATED for direct connection to secondary voltages exceeding 1 kV r.m.s. or 1,5 kV d.c. but not exceeding 63 kV r.m.s. or d.c. The divider function may be carried out wholly within the probe assembly, or partly within the test or measurement equipment to be used with the probe assembly (see [Figure 2](#)).
- c) Type C: low-voltage attenuating or divider probe assemblies. Attenuating or divider probe assemblies for direct connection to voltages not exceeding 1 kV r.m.s. or 1,5 kV d.c. The signal conditioning function may be carried out wholly within the probe assembly, or partly within the test or measurement equipment intended to be used with the probe assembly (see [Figure 3](#)).
- d) Type D: low-voltage attenuating, non-attenuating or other signal conditioning probe assemblies, that are RATED for direct connection only to voltages not exceeding 30 V r.m.s., or 42,4 V peak, or 60 V d.c., and are suitable for currents exceeding 8 A (see [Figure 4](#)).



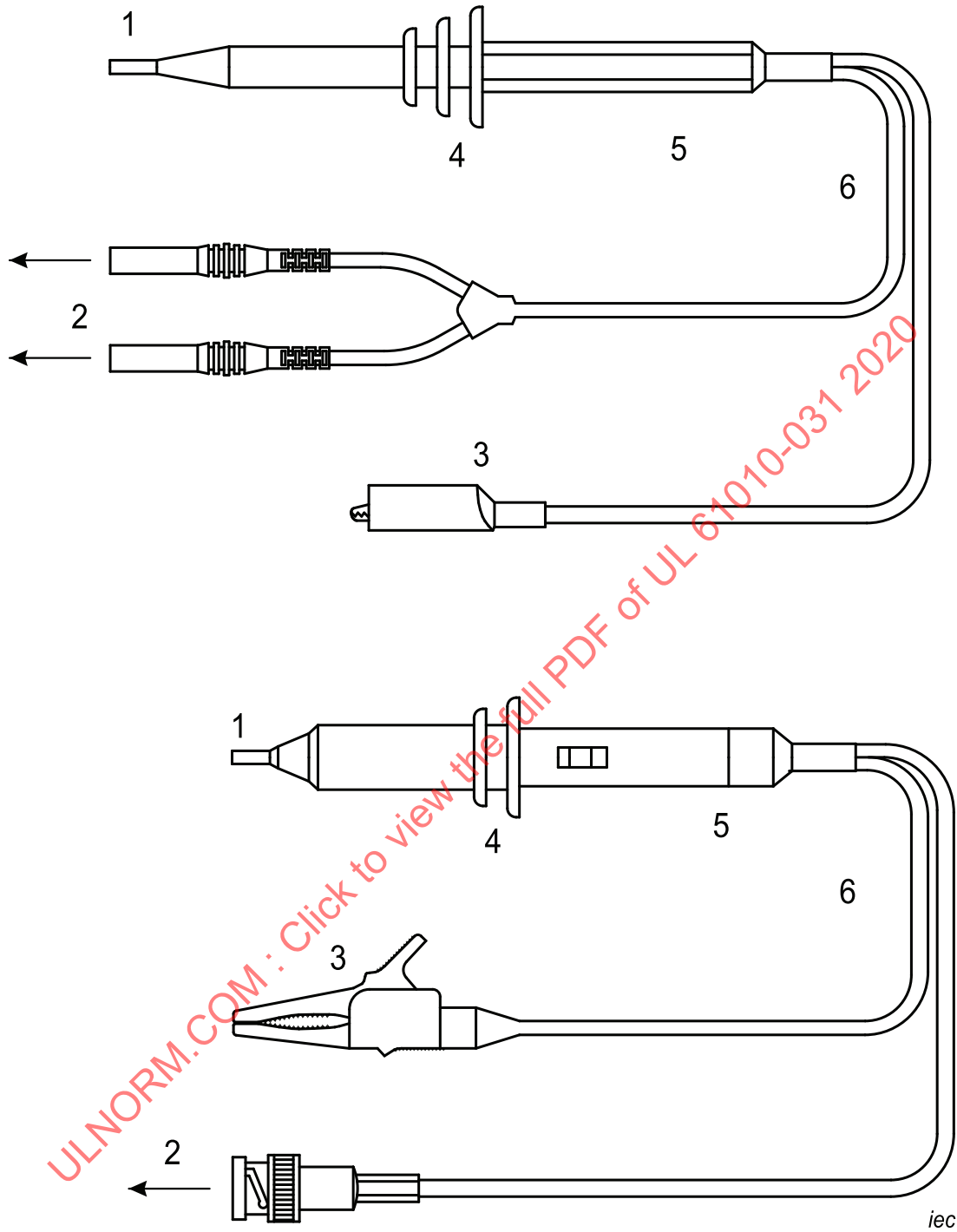
Key

- 1 typical CONNECTORS
- 2 PROBE TIP
- 3 probe body

- 4 to equipment
- 5 SPRING-LOADED CLIP
- 6 PROBE WIRE

Figure 1
Examples of type A probe assemblies

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Key

1 PROBE TIP

2 to equipment

3 reference CONNECTOR

4 PROTECTIVE FINGERGUARD

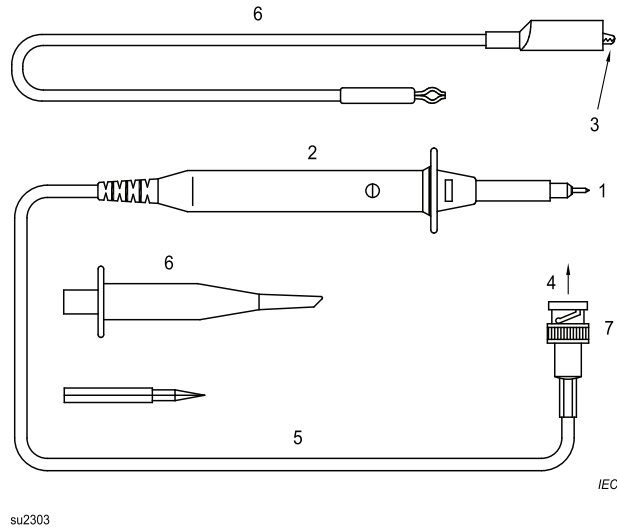
5 hand-held area of probe body

6 PROBE WIRE

Figure 2

Examples of type B probe assemblies

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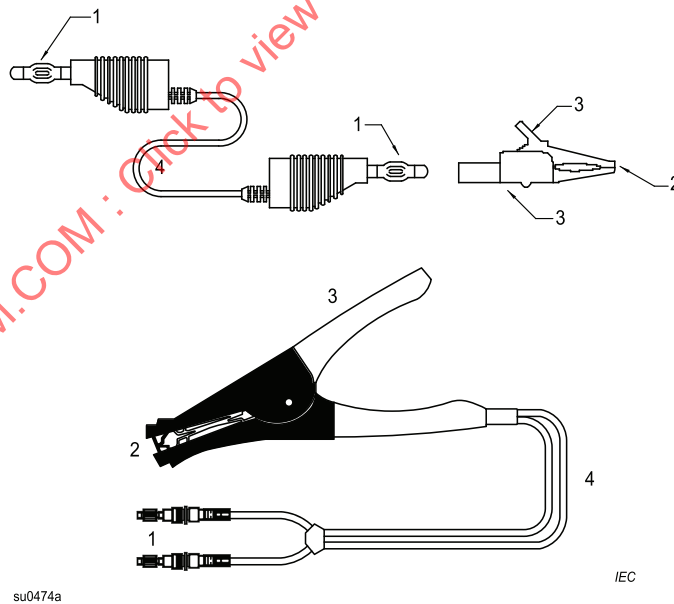
Key

- 1 PROBE TIP
- 2 probe body
- 3 reference CONNECTOR
- 4 to equipment

- 5 PROBE WIRE
- 6 examples of accessories
- 7 BNC CONNECTOR

Figure 3

Examples of type C probe assemblies



Key

- 1 CONNECTOR
- 2 PROBE TIP

- 3 hand-held area of SPRING-LOADED CLIP
- 4 PROBE WIRE

Figure 4

Examples of type D probe assemblies

1.1.2 Probe assemblies excluded from scope

This standard does not apply to current sensors within the scope of IEC 61010-2-032 (Handheld and hand-manipulated current sensors), but may apply to their input measuring circuit leads and accessories.

1.2 Object

1.2.1 Aspects included in scope

The purpose of the requirements of this standard is to ensure that HAZARDS to the OPERATOR and the surrounding area are reduced to a tolerable level.

Requirements for protection against particular types of HAZARDS are given in Clauses [6](#) to [13](#), as follows:

- a) electric shock or burn (see Clauses [6](#), [10](#) and [11](#));
- b) mechanical HAZARDS (see Clauses [7](#), [8](#) and [11](#));
- c) excessive temperature (see Clause [9](#));
- d) spread of fire from the probe assembly (see Clause [9](#));
- e) arc flash (see Clause [13](#)).

Additional requirements for probe assemblies which are designed to be powered from a low-voltage mains supply, or include other features not specifically addressed in this standard are in other parts of IEC 61010.

NOTE Attention is drawn to the possible existence of additional requirements regarding the health and safety of labour forces.

1.2.2 Aspects excluded from scope

This standard does not cover:

- a) reliable function, performance, or other properties of the probe assembly;
- b) effectiveness of transport packaging.

1.3 Verification

This standard also specifies methods of verifying that the probe assembly meets the requirements of this standard, through inspection, TYPE TESTS, and ROUTINE TESTS.

1.4 Environmental conditions

1.4.1 Normal environmental conditions

This standard applies to probe assemblies designed to be safe at least under the following conditions:

- a) altitude up to 2 000 m;