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INTERNATIONAL STANDARD

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inside

Safety requirements for electrical equipment for measurement, control and laboratory use –
Part 031: Safety requirements for hand-held probe assemblies for electrical measurement and test

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 031: Safety requirements for hand-held probe assemblies for electrical measurement and test

FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

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.

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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

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In this standard, the following print types are used:

- requirements and definitions: in roman type;
- NOTES and EXAMPLES: in smaller roman type;
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SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL AND LABORATORY USE –

Part 031: Safety requirements for hand-held probe assemblies for electrical measurement and test

1 Scope and object

1.1 Scope

1.1.1 Probe assemblies included in scope

This part of IEC 61010 ~~applies to~~ specifies safety requirements for hand-held and hand-manipulated probe assemblies of the types described below, and their related accessories ~~which are intended for professional, industrial process, and educational use~~. These probe assemblies are for ~~use in the interface between an~~ direct electrical ~~phenomenon and~~ connection between a part and electrical test ~~or~~ 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 ~~33~~ 30 V r.m.s. ~~or 46,7~~, 42,4 V peak, or ~~70~~ 60 V d.c., but not exceeding 63 kV. They do not incorporate ~~active~~ components~~, nor~~ which are ~~they~~ intended to provide a voltage divider function or a signal conditioning function, but they may contain ~~passive~~ 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 ~~or other signal conditioning~~ probe assemblies for direct connection to voltages ~~exceeding 33 V r.m.s or 46,7 V peak or 70 V d.c., but~~ 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).

~~NOTE PROBE ASSEMBLIES which~~

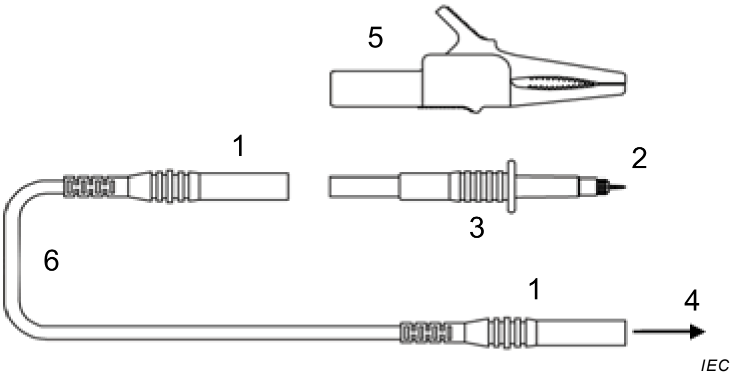
~~– are not within the definitions of types A, B or C, or,~~

~~– which are designed to be powered from a low-voltage mains supply, or~~

~~– include other features not specifically addressed in this standard~~

~~may also need to meet the relevant requirements of other parts of IEC 61010 [6]~~~~[1)]~~.

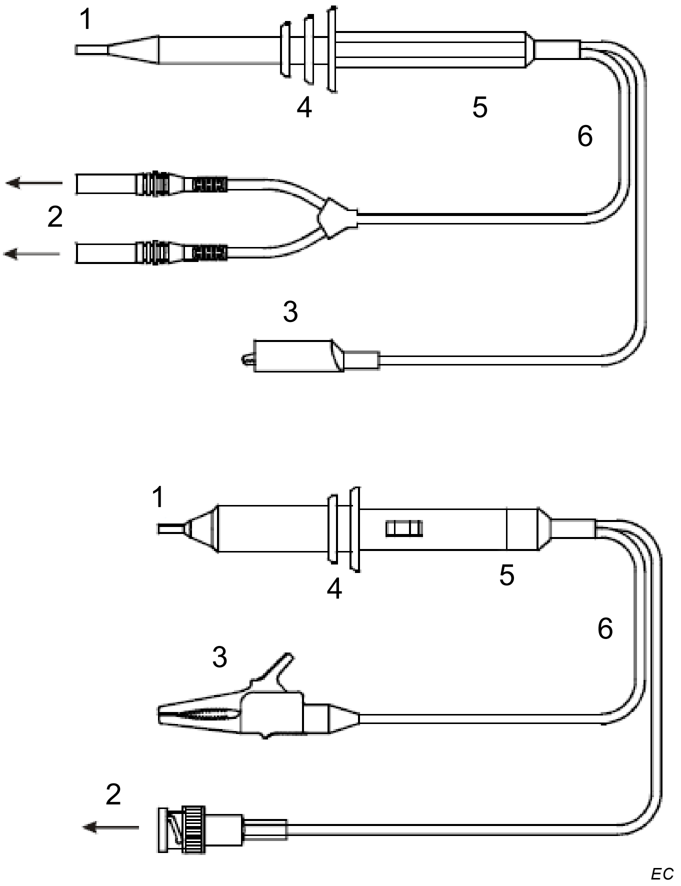
~~[1)] Figures in square brackets refer to the bibliography.~~



Key

1	typical connectors	4	to equipment
2	PROBE TIP	5	~~Crocodile clip~~ SPRING-LOADED CLIP
3	probe body	6	PROBE WIRE

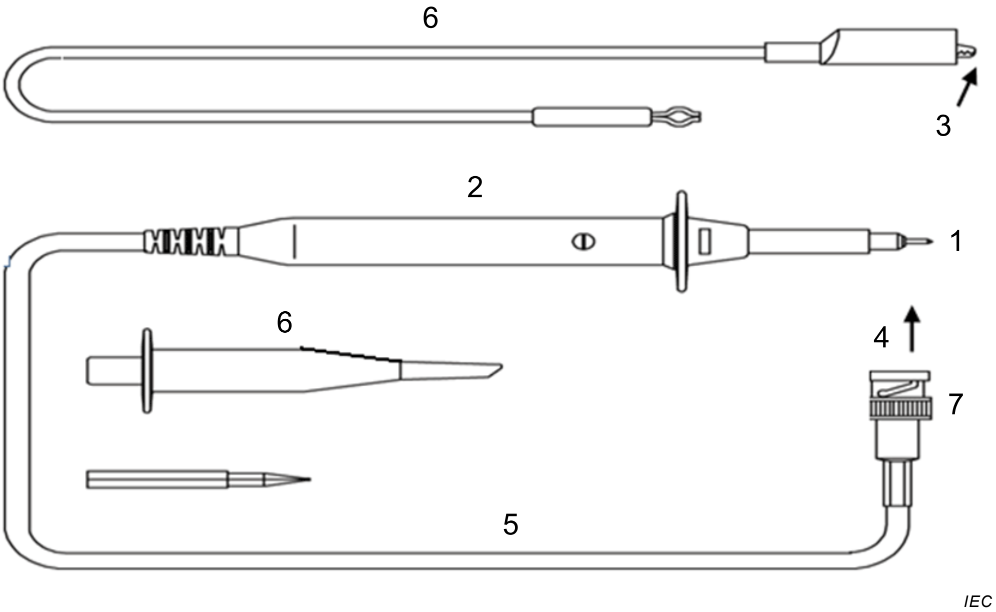
Figure 1 – Examples of type A probe assemblies



Key

1	PROBE TIP	4	~~BARRIER~~ PROTECTIVE FINGERGUARD
2	to equipment	5	hand-held area of probe body
3	reference CONNECTOR	6	PROBE WIRE

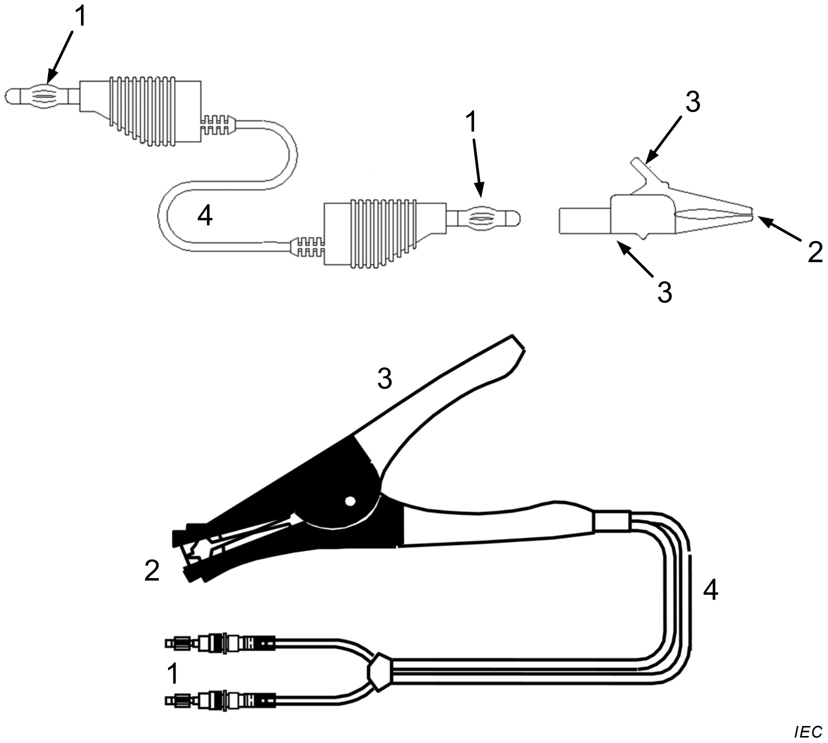
Figure 2 – Examples of type B probe assemblies



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 or clamp
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 (Hand-held 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 ~~the design and methods of construction used provide adequate protection for~~ HAZARDS to the OPERATOR and the surrounding area ~~against~~ 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 ~~which may be specified by national authorities responsible for~~ 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.

~~c) servicing (repair);~~

~~d) protection of servicing (repair) personnel.~~

~~NOTE Servicing personnel are expected to be reasonably careful in dealing with obvious HAZARDS, but the design should protect against mishap in an appropriate manner, and the service documentation should point out any residual HAZARDS.~~

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~~, or above 2 000 m if specified by the manufacturer~~;

b) ambient temperature of 5 °C to 40 °C~~; or below 5 °C or above 40 °C if specified by the manufacturer~~;

c) maximum relative humidity of 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C;

d) applicable~~ RATED~~ POLLUTION DEGREE of the intended environment.

1.4.2 Extended environmental conditions

This standard applies to probe assemblies designed to be safe not only in the environmental conditions specified in 1.4.1, but also in any of the following conditions as RATED by the manufacturer of the probe assemblies:

a) outdoor use;

b) altitudes above 2 000 m;

c) ambient temperatures below 5 °C or above 40 °C;

d) relative humidities above the levels specified in 1.4.1;

e) WET LOCATIONS.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60027 (all parts), *Letters symbols to be used in electrical technology*

~~IEC 60060 (all parts), *High-voltage test techniques*~~

~~IEC 60417 (all parts), *Graphical symbols for use on equipment*~~

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

~~IEC 60664-3, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coatings to achieve insulation coordination of printed board assemblies*~~

IEC 61010-1:2010, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*

IEC 61180-1:1992, *High-voltage test techniques for low voltage equipment – Part 1: Definitions, test and procedure requirements*

IEC 61180-2, *High-voltage test techniques for low-voltage equipment – Part 2: Test equipment*

IEC GUIDE 104, *The preparation of safety publications and the use of basic safety publications and group safety publications*

ISO/IEC GUIDE 51, *Safety aspects – Guidelines for their inclusion in standards*

~~ISO 7000, *Graphical symbols for use on equipment – Index and synopsis*~~

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Edition 2.0 2015-05

INTERNATIONAL STANDARD

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GROUP SAFETY PUBLICATION
PUBLICATION GROUPÉE DE SÉCURITÉ

Safety requirements for electrical equipment for measurement, control and laboratory use –
Part 031: Safety requirements for hand-held probe assemblies for electrical measurement and test

Règles de sécurité pour appareils électriques de mesurage, de régulation et de laboratoire –
Partie 031: Exigences de sécurité pour sondes équipées tenues à la main pour mesurage et essais électriques

IEC 61010-031:2015-05(en-fr)

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Part 031: Safety requirements for hand-held probe assemblies for electrical measurement and test

1 Scope and object

1.1 Scope

1.1.1 Probe assemblies included in scope

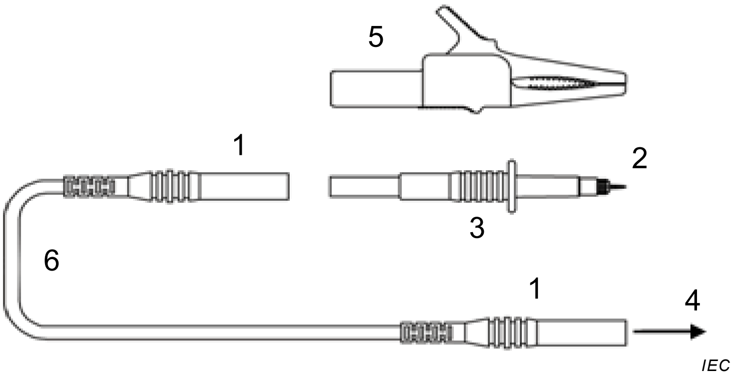
This part of IEC 61010 specifies safety requirements for hand-held and hand-manipulated probe assemblies of the types described below, and their related accessories. These probe assemblies are for direct electrical connection between a part and electrical test and measurement equipment. They may be fixed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

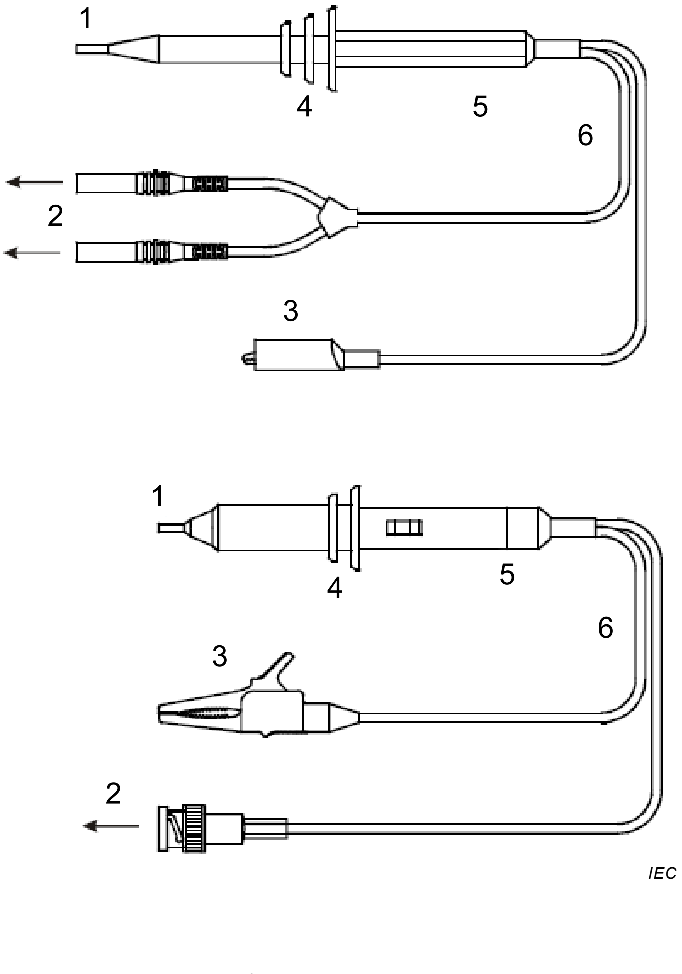
d) Type D: low-voltage attenuating, non-attenuating or other signal conditioning probe assemblies, that are RATED for direct connection only to voltages not exceeding 30 V r.m.s., or 42,4 V peak, or 60 V d.c., and are suitable for currents exceeding 8 A (see Figure 4).



Key

1	typical CONNECTORS	4	to equipment
2	PROBE TIP	5	SPRING-LOADED CLIP
3	probe body	6	PROBE WIRE

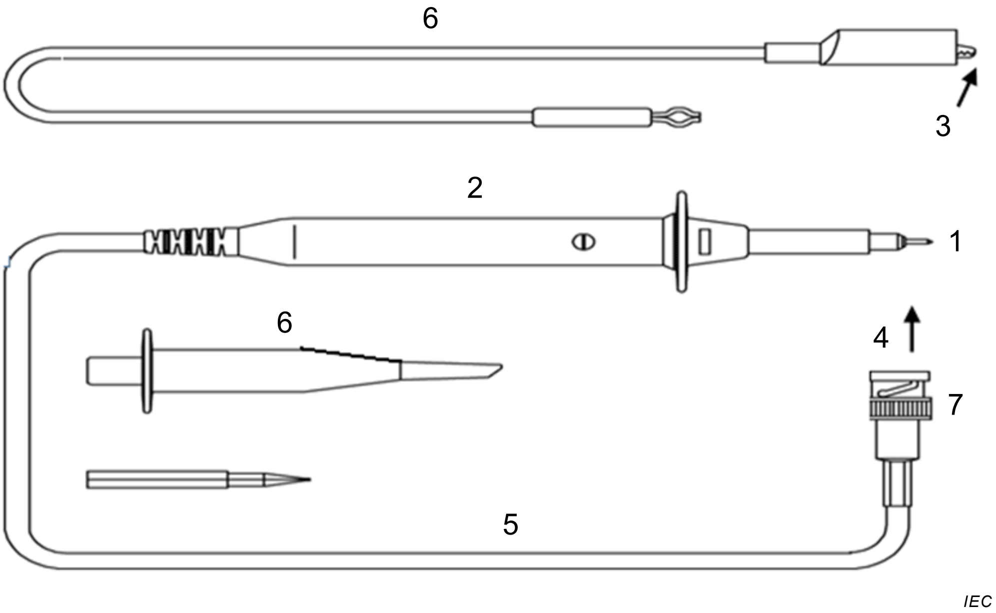
Figure 1 – Examples of type A probe assemblies



Key

1	PROBE TIP	4	PROTECTIVE FINGERGUARD
2	to equipment	5	hand-held area of probe body
3	reference CONNECTOR	6	PROBE WIRE

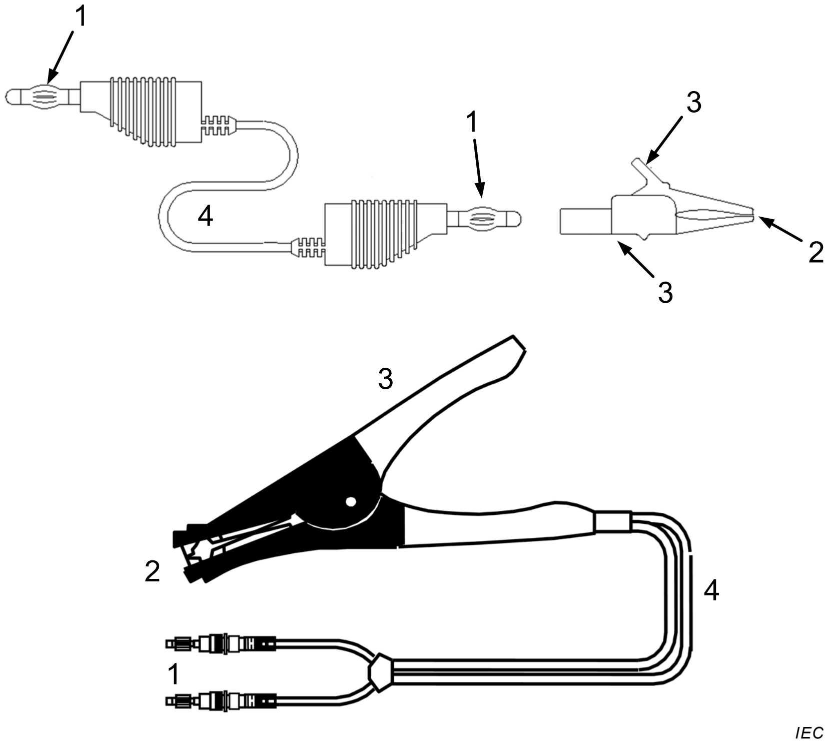
Figure 2 – Examples of type B probe assemblies



Key

1	PROBE TIP	5	PROBE WIRE
2	probe body	6	examples of accessories
3	reference CONNECTOR	7	BNC CONNECTOR
4	to equipment		

Figure 3 – Examples of type C probe assemblies



Key

1	CONNECTOR	3	hand-held area of SPRING-LOADED CLIP or clamp
2	PROBE TIP	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 (Hand-held 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;

b) ambient temperature of 5 °C to 40 °C;

c) maximum relative humidity of 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C;

d) applicable POLLUTION DEGREE of the intended environment.

1.4.2 Extended environmental conditions

This standard applies to probe assemblies designed to be safe not only in the environmental conditions specified in 1.4.1, but also in any of the following conditions as RATED by the manufacturer of the probe assemblies:

a) outdoor use;

b) altitudes above 2 000 m;

c) ambient temperatures below 5 °C or above 40 °C;

d) relative humidities above the levels specified in 1.4.1;

e) WET LOCATIONS.

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