IEC 61010-2-030

Edition 2.0 2017-01
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

GROUP SAFETY PUBLICATION

Safety requirements for electrical equipment for measurement, control, and laboratory use –
Part 2-030: Particular requirements for equipment having testing ~~and~~ or measuring circuits

IEC 61010-2-030:2017-01 RLV(en)

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue
The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org
The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary
65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

IEC 61010-2-030

Edition 2.0 2017-01
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

GROUP SAFETY PUBLICATION

Safety requirements for electrical equipment for measurement, control, and laboratory use –
Part 2-030: Particular requirements for equipment having testing ~~and~~ or measuring circuits

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 19.080; 71.040.10

ISBN 978-2-8322-3833-2

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

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

Part 2-030: Particular requirements for equipment having testing ~~and~~ or measuring circuits

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.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
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.

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 61010-2-030 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.

This second edition cancels and replaces the first edition published in 2010. This edition constitutes a technical revision.

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

a) Reference to IEC 61010-031 for probe assemblies and IEC 61010-032 for current sensors has been added.
b) Indirect bonding for testing and measuring circuits has been modified, in particular to take into account the duration of current flow versus body current for a.c. and d.c. currents according to IEC TS 60479-1 and IEC TS 60479-2.
c) CLEARANCE and CREEPAGE DISTANCE for WET LOCATIONS and for measuring circuit TERMINAL exceeding 1 000 V a.c. or d.c have been specified.
d) The voltage source for testing overvoltage limiting component or circuit may be limited to 400 V.
e) Requirements against TRANSIENT OVERVOLTAGES for MAINS voltage measuring circuits have been added.
f) Requirements for measuring circuits from 1 000 V d.c. to 1 500 V d.c. have been added.
g) The corrigendum has been included in Tables K.102 to K.104.
h) Requirements for reduction of TRANSIENT OVERVOLTAGES have been modified.
i) An informative Annex CC about the dimensions of banana TERMINALS has been added.
j) 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
66/613/FDIS	66/621/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 Part 2-030 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, including its amendment 1 (2016).

This Part 2-030 supplements or modifies the corresponding clauses in IEC 61010-1 so as to convert that publication into the IEC standard: *Particular requirements for equipment having testing or measuring circuits.*

Where a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. Where this part 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 test: 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).

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*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

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

IEC 61010-1 specifies the safety requirements that are generally applicable to all equipment within its scope. For certain types of equipment, the requirements of IEC 61010-1 and its amendment will be supplemented or modified by the special requirements of one, or more than one, particular Part 2 of the standard which are read in conjunction with the Part 1 requirements.

This Part 2-030 specifies the safety requirements for equipment with testing or measuring circuits which are connected for test or measurement purposes to devices or circuits outside the measurement equipment itself.

Part 2-032 specifies the safety requirements for HAND-HELD and hand-manipulated current sensors (see Clause 1 of Part 2-032). Requirements of Part 2-030 have been included in Part 2-032. Equipment within the scopes of Part 2-030 and Part 2-032 are considered to be covered by the requirements of Part 2-032.

Part 2-033 specifies the safety requirements for HAND-HELD MULTIMETERS and other METERS that have a primary purpose of measuring voltage on a live MAINS. Requirements of Part 2-030 have been included in Part 2-033. Parts of equipment within the scopes of Part 2-030 and Part 2-033 are considered to be covered by the requirements of Part 2-033.

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. Requirements of Part 2-030 have been included in Part 2-034. Equipment within the scopes of Part 2-030 and Part 2-034 are considered to be covered by the requirements of Part 2-034.

However, for equipment within the scope of Part 2-032, Part 2-033 and Part 2-034, the standards are read in conjunction.

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

Part 2-030: Particular requirements for equipment having testing ~~and~~ or measuring circuits

1 Scope and object

This clause of Part 1 is applicable except as follows:

1.1.1 Equipment included in scope

Replacement:

Replace the text with the following:

This group safety publication is primarily intended to be used as a product safety standard for the products mentioned in the scope, but shall also be used by technical committees in the preparation of their publications for products similar to those mentioned in the scope of this standard, in accordance with the principles laid down in IEC Guide 104 and ISO/IEC Guide 51.

This part of IEC 61010 specifies safety requirements for equipment having testing ~~and~~ or measuring circuits which are connected for test or measurement purposes to devices or circuits outside the measurement equipment itself.

These include measuring circuits which are part of electrical test and measurement equipment, laboratory equipment, or process control equipment. The existence of these circuits in equipment requires additional protective means between the circuit and an OPERATOR.

NOTE ~~1~~ These testing and measuring circuits ~~may~~ can, for example:

– measure voltages in circuits of other equipment,
– measure temperature of a separate device via a thermocouple,
– measure force on a separate device via a strain gauge,
– inject a voltage onto a circuit to analyse a new design.

~~NOTE 2 Testing and measuring circuits that are not within the scope of this Part 2 are considered to be covered by the requirements of Part 1.~~

~~NOTE 3~~ Equipment ~~containing~~ having these testing and measuring circuits may be intended for performing tests and measurements on hazardous conductors, including MAINS conductors and telecommunication network conductors. See Annex BB for considerations of HAZARDS involved in various tests and measurements.

2 Normative references

This clause of Part 1 is applicable except as follows:

Replacement:

Replace

IEC 60364-4-44, *Low-voltage electrical installations – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*

with the following new reference:

IEC 60364-4-44:2007, *Low-voltage electrical installations – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*
IEC 60364-4-44:2007/AMD1:2015

Addition:

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

Replacement:

Replace the definition of 3.5.4 with the following new definition:

3.5.4
MAINS
low-voltage electricity supply system

Addition:

Add the following new definition:

3.5.101
MEASUREMENT CATEGORY
classification of testing and measuring circuits according to the type of MAINS ~~CIRCUITS~~ 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.

5 Marking and documentation

This clause of Part 1 is applicable except as follows:

5.1.5 TERMINALS, connections and operating devices

Addition:

Add the following new subclause:

5.1.5.101 Measuring circuit TERMINALS

5.1.5.101.1 General

Except as permitted in 5.1.5.101.4:

a) the value of the RATED voltage to earth of measuring circuit TERMINALS shall be marked, and

b) the value of the RATED voltage or the RATED current, as applicable, of each pair or set of measuring circuit TERMINALS that are intended to be used together shall be marked, and

c) the pertinent MEASUREMENT CATEGORY for each individual pair or set of measuring circuit TERMINALS or symbol 14 of Table 1 shall be marked as specified in 5.1.5.101.2 and 5.1.5.101.3, if applicable.

~~NOTE 1~~ Measuring circuit TERMINALS are usually supplied 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 may have a RATED voltage to earth. ~~Some instruments may have a measurement~~ For some equipment, the RATED voltage ~~(~~between TERMINALS~)~~ may be different from the RATED voltage to earth. Markings ~~should~~ shall be clear to avoid misunderstanding.

Symbol 14 of Table 1 shall be marked if current measuring TERMINALS are not intended for connection to current transformers without internal protection (see 101.2).

Markings shall be placed adjacent to the TERMINALS. However, if there is insufficient space (as in multi-input equipment), the marking may be on the RATING plate or scale plate, or the TERMINAL may be marked with symbol 14 of Table 1.

~~NOTE 2~~ For any set of measuring circuit TERMINALS, symbol 14 of Table 1 does not need to be marked more than once, if it is close to the TERMINALS.

Conformity is checked by inspection and, if applicable, as specified in 5.1.5.101.2 and 5.1.5.101.3, taking the exceptions in 5.1.5.101.4 into account.

5.1.5.101.2 Measuring circuit TERMINALS RATED for MEASUREMENT CATEGORIES II, III or IV

The relevant MEASUREMENT CATEGORY shall be marked for measuring circuit TERMINALS RATED for measurements within MEASUREMENT CATEGORIES II, III or IV. The MEASUREMENT CATEGORY markings shall be "CAT II", "CAT III" or "CAT IV" as applicable.

~~NOTE~~ Marking more than one type of MEASUREMENT CATEGORY and its RATED voltage to earth is permissible ~~(see also 5.1.5.101.1, Note 1)~~.

Conformity is checked by inspection.

5.1.5.101.3 Measuring circuit TERMINALS RATED for connection to voltages above the levels of 6.3.1

Symbol 14 of Table 1 shall be marked for measuring circuit TERMINALS RATED for connection to voltages above the levels of 6.3.1, but that are not RATED for measurements within MEASUREMENT CATEGORIES II, III or IV (see also 5.4.1 bb)).

Conformity is checked by inspection.

5.1.5.101.4 Permanently connected, dedicated, or low voltage measuring circuit TERMINALS

Measuring circuit TERMINALS do not need to be marked if:

a) they are intended to be permanently connected and not ACCESSIBLE (see 5.4.3 aa) and bb)), or

b) they are dedicated only for connection to specific TERMINALS of other equipment, or

c) it is obvious from other indications that the RATED voltage is below the levels of 6.3.1.

NOTE Examples of acceptable indications that the inputs are intended to be ~~less than~~ below the levels of 6.3.1 include:

– the full scale deflection marking of a single-range indicating voltmeter or ammeter or maximum marking of a multi-range multimeter;

– the maximum range marking of a voltage selector switch;

– a marked voltage or power RATING expressed in dB, mW or W, where the equivalent value, as explained in the documentation, is below ~~33~~ 30 V a.c.

Conformity is checked by inspection.

5.4.1 General

Addition:

Add the following new items to the list and a new paragraph:

aa) information about each relevant MEASUREMENT CATEGORY if the measuring circuit has a RATING for MEASUREMENT CATEGORY II, III or IV (see 5.1.5.101.2);

bb) for measuring circuits that do not have a RATING for MEASUREMENT CATEGORY II, III or IV, but could be misused by connection to such circuits, a warning not to use the equipment for measurements on MAINS ~~CIRCUITS~~, and a detailed RATING including TRANSIENT OVERVOLTAGES (see AA.2.4 for more information).

~~NOTE~~ Some equipment may have multiple MEASUREMENT CATEGORY RATINGS for the same measuring circuit. For such equipment, the documentation ~~needs to~~ shall clearly identify the MEASUREMENT CATEGORIES where the equipment is intended to be used and where it must not be used.

5.4.3 Equipment installation

Addition:

Add the following new items to the list:

aa) for ~~permanently connected~~ measuring circuit TERMINALS intended for permanent connection and that are RATED for MEASUREMENT CATEGORIES II, III or IV, information regarding the MEASUREMENT CATEGORY, RATED ~~maximum WORKING~~ voltages or RATED ~~maximum~~ currents, as applicable (see 5.1.5.101.2);

bb) for ~~permanently connected~~ measuring circuit TERMINALS intended for permanent connection and that are not RATED for MEASUREMENT CATEGORIES II, III or IV, information regarding the RATED ~~maximum WORKING~~ voltages, RATED ~~maximum~~ currents, and RATED ~~maximum~~ TRANSIENT OVERVOLTAGES as applicable (see 5.1.5.101.4).

6 Protection against electric shock

This clause of Part 1 is applicable except as follows:

6.1.2 Exceptions

Add the following new item to the list:

aa) locking or screw-held type measuring TERMINALS, including TERMINALS which do not require the use of a TOOL.

6.5.2.1 General

Replacement:

Replace the conformity statement with the following:

Conformity is checked as specified in 6.5.2.2 to 6.5.2.6 and 6.5.2.101.

6.5.2.3 PROTECTIVE CONDUCTOR TERMINAL

Replacement:

Replace h) 2) with the following:

h) 2) the PROTECTIVE BONDING shall not be interrupted by any switching or interrupting device. Devices used for indirect bonding in testing and measuring circuits (see 6.5.2.101) are permitted to be part of the PROTECTIVE BONDING.

Addition:

Add the following new subclause and figure:

6.5.2.101 Indirect bonding for testing and measuring circuits

Indirect bonding establishes a connection between the PROTECTIVE CONDUCTOR TERMINAL and ACCESSIBLE conductive parts if these become HAZARDOUS LIVE as a result of a fault.

Devices to establish indirect bonding are the following:

a) Voltage limiting devices which become conductive when the voltage across them exceeds the relevant levels of 6.3.2 a), with overcurrent protection to prevent breakdown of the device. The duration versus the current shall not exceed the levels of Figure 101.

Conformity is checked by connecting the ACCESSIBLE conductive parts to the ~~MAINS supply TERMINALS while the equipment is connected to the MAINS supply as~~ maximum HAZARDOUS LIVE voltage according to the equipment RATINGS while the equipment is operated in NORMAL USE. The ~~voltage~~ current between the ACCESSIBLE conductive parts and the PROTECTIVE CONDUCTOR TERMINAL ~~shall not exceed the relevant levels of 6.3.2 a) for more than 0,2 s~~ is measured with the circuit of Figure A.1.

b) Voltage-sensitive tripping devices which interrupt all poles of the MAINS supply or the HAZARDOUS LIVE voltage source, and connect the ACCESSIBLE conductive parts to the PROTECTIVE CONDUCTOR TERMINAL whenever the voltage across them reaches the relevant levels of 6.3.2 a). The tripping duration versus the current shall not exceed the levels of Figure 101.

Conformity is checked by applying successively the relevant voltage level of 6.3.2 a) and the maximum RATED voltage between the ACCESSIBLE conductive parts and the PROTECTIVE CONDUCTOR TERMINAL. ~~The tripping action shall take place within 0,2 s.~~ The current between the ACCESSIBLE conductive parts and the PROTECTIVE CONDUCTOR TERMINAL is measured with the circuit of Figure A.1.

Voltage limiting devices or voltage-sensitive tripping devices as defined in a) and b), shall have at least the voltage and current RATINGS of the measuring TERMINALS.