

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



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

**Part 2-201: Particular requirements for control equipment**

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

**Partie 2-201: Exigences particulières pour les équipements de commande**

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IEC 61010-2-201

Edition 3.0 2024-10

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COMMISSION

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## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	7
1 Scope and object.....	8
2 Normative references .....	10
3 Terms and definitions .....	10
4 Tests .....	13
5 Marking and documentation.....	14
6 Protection against electric shock .....	17
7 Protection against mechanical HAZARDS.....	31
8 Resistance to mechanical stresses .....	32
9 Protection against the spread of fire .....	34
10 Equipment temperature limits and resistance to heat.....	39
11 Protection against HAZARDS from fluids and solid foreign objects .....	45
12 Protection against radiation, including laser sources, and against sonic and ultrasonic pressure .....	45
13 Protection against liberated gases and substances, explosion and implosion .....	46
14 Components and subassemblies .....	46
15 Protection by interlocks .....	50
16 HAZARDS resulting from application .....	50
17 RISK assessment.....	50
Annexes .....	51
Annex E (informative) Guidelines for reduction of POLLUTION DEGREES .....	52
Annex F (normative) ROUTINE TESTS .....	54
Annex L (informative) Index of defined terms .....	56
Annex AA (informative) General approach to safety for control equipment .....	57
Annex BB (informative) System drawing of isolation boundaries .....	60
Annex CC (informative) Historical techniques for secondary circuits .....	71
Annex DD (normative) Flammability test for magnesium alloy fire ENCLOSURES or flame barriers (see 9.3.2) .....	75
Annex EE (informative) Information and documentation and correlation to their uses.....	76
Annex FF (informative) Measurement of CLEARANCES and CREEPAGE DISTANCES.....	78
Bibliography.....	80
Figure 101 – Typical INTERFACE/PORT of control equipment .....	19
Figure 102 – Examples of insulation between separate circuits and between circuits and ACCESSIBLE conductive parts .....	24
Figure 103 – Mechanical HAZARDS, with regard to PANEL MOUNTED EQUIPMENT .....	31
Figure 104 – Spread of fire HAZARDS, with regard to PANEL MOUNTED EQUIPMENT.....	35
Figure 12 – Baffle .....	37
Figure 13 – Area of the bottom of an ENCLOSURE to be constructed as specified in 9.3.2 c) 1).....	38
Figure 105 – General temperature test environment .....	41
Figure 106 – Vented equipment .....	42

Figure 107 – Non-vented equipment .....	43
Figure 108 – PANEL MOUNTED EQUIPMENT extending through the wall of the end location ENCLOSURE .....	44
Figure AA.1 – Control equipment access and safety concerns .....	57
Figure BB.1 – Typical system ENCLOSURE layout .....	60
Figure BB.2 – Simplified system schematic .....	62
Figure BB.3 – HAZARD situation of the control equipment .....	63
Figure BB.4 – Application of IEC 61010-2-201 to the control equipment safety drawing .....	64
Figure BB.5 – Application of 6.7.1.5 items a) and b) to the control equipment safety drawing .....	64
Figure BB.6 – Application of 6.7.1.5 items a), b), c) and d) to the control equipment safety drawing .....	65
Figure BB.7 – REINFORCED INSULATION .....	66
Figure BB.8 – BASIC INSULATION .....	67
Figure BB.9 – REINFORCED INSULATION, BASIC INSULATION and impedance .....	68
Figure BB.10 – REINFORCED INSULATION from external power supplies .....	69
Figure BB.11 – BASIC INSULATION from external power supplies .....	70
Figure EE.1 – Information and documentation for component products .....	76
Figure EE.2 – Information and documentation accumulation and segregation tree for an example installation .....	77
Figure FF.1 – Path of a component mounted to a PWB (side view) .....	79
Figure FF.2 – Path of a component mounted to a PWB (side view) .....	79
Table 101 – INTERFACES, PORTS AND TERMINALS considered as OPERATOR ACCESSIBLE for OPEN and ENCLOSED EQUIPMENT .....	18
Table 3 – Multiplication factors for clearances of equipment rated for operation at altitudes up to 5 000 m .....	25
Table 4 – CLEARANCE and CREEPAGE DISTANCES for MAINS CIRCUITS of OVERVOLTAGE CATEGORY II up to 300 V .....	27
Table 5 – Test voltages for solid insulation between MAINS and between MAINS and secondary circuits OVERVOLTAGE CATEGORY II up to 300 V .....	28
Table 6 – CLEARANCES and test voltages for secondary circuits derived from MAINS CIRCUITS of OVERVOLTAGE CATEGORY II up to 300 V .....	29
Table 16 – Acceptable perforation of the bottom of an ENCLOSURE .....	36
Table 19 – Surface temperature limits, under NORMAL CONDITION .....	39
Table 102 – Overload and endurance test voltages .....	47
Table 103 – Overload test circuit values .....	49
Table 104 – Endurance test circuit values .....	50
Table E.1 – Environmental situations .....	52
Table E.2 – Reduction of POLLUTION DEGREES (PD) .....	53
Table CC.1 – Limits of output current and output power for inherently limited power sources .....	74
Table CC.2 – Limits of output current, output power and RATINGS for over-current protective devices for non-inherently limited power sources .....	74
Table FF.1 – Dimensions of X .....	78

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT  
FOR MEASUREMENT, CONTROL, AND LABORATORY USE –****Part 2-201: Particular requirements for control equipment**

## FOREWORD

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IEC 61010-2-201 has been prepared by IEC technical committee 65: Industrial-process measurement, control and automation. It is an International Standard.

This third edition cancels and replaces the second edition published in 2017. This edition constitutes a technical revision.

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

- a) 1.1.1: the related equipment included in the Scope has been clarified;
- b) 4.3.2.101: the optical fibre module has been deleted;
- c) 5.4.3: equipment installation has been clarified;

- d) 6.7.1.1: revision of the figure representing insulation between separate circuits has been included;
- e) 6.7.101: the subclause relating to insulation for FIELD WIRING TERMINALS of OVERVOLTAGE CATEGORY II with a nominal voltage up to 1 000 V has been deleted;
- f) 6.7.1.101: a new subclause relating to insulation for SELV/PELV CIRCUITS has been included;
- g) 6.8.3: specification of voltage tester has been added;
- h) 6.9.3: an additional exception relating to colour coding has been included;
- i) 6.9.101: a new subclause relating to wiring for secondary circuits e.g. SELV/PELV has been included;
- j) 8.2.2.101: additional requirements for glass displays have been included;
- k) 8.3: the subclause relating to the drop test has been removed;
- l) 9.3.2: additional requirements for material of connectors and insulating material have been included;
- m) The particular requirements for non-metallic material have been clarified;
- n) Clause 11: the particular requirements for protection against HAZARDS from fluid and solid foreign objects have been removed;
- o) 12.4: an additional subclause relating to microwave radiation has been included;
- p) 14.102: the description of switching devices has been clarified;

The text of this International Standard is based on the following documents:

Draft	Report on voting
65/1049/FDIS	65/1095/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

A list of all 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 document is to be used in conjunction with IEC 61010-1:2010, and IEC 61010-1:2010/AMD1:2016.

This document supplements or modifies the corresponding clauses in IEC 61010-1 so as to convert that publication into the IEC standard: *Particular requirements for control equipment*.

Where a particular subclause of IEC 61010-1 is not mentioned in this document, that subclause applies as far as is reasonable. Where this document states "addition", "modification", "replacement", or "deletion", the relevant requirement, test specification or note in IEC 61010-1 should be adapted accordingly.



In this document,

a) the following print types are used:

- requirements and definitions: in roman type;
- NOTES: in smaller roman type;
- *conformity and tests: in italic type*;
- terms used throughout this document which have been defined in Clause 3: SMALL ROMAN CAPITALS.

b) subclauses, figures, tables and notes which are additional to those in IEC 61010-1 are numbered starting from 101. Additional annexes are lettered starting from AA and additional list items are lettered from aa).

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- withdrawn, or
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## INTRODUCTION

IEC 61010-2-2xx documents are a series of standards on the safety of industrial-process measurement, control and automation equipment.

This document specifies the complete safety related requirements and related tests for control equipment (e.g. programmable controller (PLC), the components of distributed control systems (DCS), I/O devices, human machine interface (HMI)).

Safety terms of general use are defined in IEC 61010-1. More specific terms are defined in each relevant part of the IEC 61010 series.

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

## Part 2-201: Particular requirements for control equipment

### 1 Scope and object

IEC 61010-1:2010, Clause 1 and IEC 61010-1:2010/AMD1:2016, Clause 1 apply, except as follows:

#### 1.1.1 Equipment included in scope

*Replacement:*

*Replace the existing text with the following:*

This part of IEC 61010 specifies safety requirements and related verification tests for control equipment or their associated peripherals, or both.

Some equipment examples are:

- programmable logic controller (PLC);
- programmable automation controller (PAC);
- distributed control systems (DCS);
- industrial PC (computers) and panel PC;
- programming and debugging tools (PADTs);
- displays and human-machine interfaces (HMI);
- any product performing the function of control equipment or their associated peripherals, or both;
- positioners; and
- control equipment which have as their intended use the command and control of machines, automated manufacturing and industrial processes, for example discrete and continuous control.

Components of the above named equipment and within the scope of this document are, for example:

- (auxiliary) stand-alone power supplies;
- peripherals such as digital and analogue I/O,
- remote-I/O;
- industrial network equipment, embedded or stand-alone (e.g. switches, routers, wireless base station).

Control equipment and their associated peripherals are intended to be used in an industrial environment. This document considers equipment designed as OPEN or ENCLOSED EQUIPMENT.

NOTE 1 Control equipment intended also for use in other environments or for other purposes (example: for use in building installations to control light or other electrical installations, or for use on cars, trains or ships) can have additional conformity requirements defined by the safety standard(s) for these applications. These requirements can involve for example: insulation, spacings and power restrictions.

NOTE 2 Computing devices and similar equipment within the scope of the IEC 60950 series or the IEC 62368 series and conforming to their requirements are considered to be suitable for use with control equipment within the scope of this document. However, some of the requirements of the IEC 60950 series for resistance to moisture and liquids are less stringent, IEC 61010-1:2010, 5.4.4, second paragraph takes this aspect into account.

Control equipment covered in this document is typically intended for use in OVERVOLTAGE CATEGORY II (IEC 60664-1) in low-voltage installations, where the RATED equipment supply voltage does not exceed 1 000 V a.c. RMS (50/60 Hz), or 1 000 V d.c..

Where control equipment is intended for installation to supply systems with OVERVOLTAGE CATEGORY III or IV, additional requirements are identified in Annex K.

The requirements of ISO/IEC Guide 51 and IEC Guide 104, as they relate to this part of IEC 61010, are incorporated herein.

### 1.1.2 Equipment excluded from scope

*Replacement:*

*Replace the existing text with the following:*

This document does not deal with aspects of the overall automated system, for example a complete assembly line. Control equipment (e.g. DCS and PLC), their application programme and their associated peripherals are considered as components (components in this context are items which perform no useful function by themselves) of an overall automated system.

Since control equipment (e.g. DCS and PLC) are component devices, safety considerations for the overall automated system including installation and application are beyond the scope of this document. Refer to the IEC 60364 series or applicable national and local regulations for electrical installation and guidelines.

### 1.2.1 Aspects included in scope

*Replace the first sentence with the following:*

The purpose of the requirements of this document is to ensure that all HAZARDS to the OPERATOR, SERVICE PERSONNEL and the surrounding area are reduced to a tolerable level.

NOTE By using the terms "OPERATOR" and "SERVICE PERSONNEL" this document considers the perception of HAZARDS depending on training and skills. Annex AA provides a general approach in this regard.

### 1.2.2 Aspects excluded from scope

*Replacement:*

*Replace the existing text with the following:*

This document does not cover:

- a) reliability, functionality, performance, or other properties of the control equipment not related to safety;
- b) mechanical or climatic requirements for operation, transport or storage;
- c) EMC requirements (see e.g. the IEC 61326 series or IEC 61131-2);
- d) protective measures for explosive atmospheres (see e.g. the IEC 60079 series);
- e) functional safety (see e.g. the IEC 61508 series, IEC 61131-6).

## 2 Normative references

IEC 61010-1:2010, Clause 2 and IEC 61010-1:2010/AMD1:2016, Clause 2 apply, except as follows:

*Addition:*

*Add the following new references:*

IEC 60384-14, *Fixed capacitors for use in electronic equipment – Part 14: Sectional specification – Fixed capacitors for electromagnetic interference suppression and connection to the supply mains*

IEC 60695-2-11, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end products (GWEPT)*

IEC 60695-11-3, *Fire hazard testing – Part 11-3: Test flames – 500 W flames – Apparatus and confirmational test methods*

IEC 60695-11-20, *Fire hazard testing – Part 11-20: Test flames – 500 W flame test method*

IEC 60947-4-1, *Low-voltage switchgear and controlgear – Part 4-1: Contactors and motor-starters – Electromechanical contactors and motor-starters*

IEC 60947-4-2, *Low-voltage switchgear and controlgear – Part 4-2: Contactors and motor-starters – Semiconductor motor controllers, starters and soft-starters*

IEC 60947-5-1:2016, *Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices*

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

IEC 61010-1:2010/AMD1:2016

IEC 61010-2-030, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 2-030: Particular requirements for equipment having testing or measuring circuits*

IEC 61810-1:2015, *Electromechanical elementary relays – Part 1: General and safety requirements*

## 3 Terms and definitions

IEC 61010-1:2010, Clause 3 applies, except as follows:

### 3.1.3

#### PORTABLE EQUIPMENT

*Modification:*

*Replace the definition with the following:*

equipment intended to be carried by hand and not fixed during NORMAL USE

### 3.2.3

#### PROTECTIVE CONDUCTOR TERMINAL

*Modification:*

*Replace the term "PROTECTIVE CONDUCTOR TERMINAL" with "PROTECTIVE EARTH TERMINAL" and add the following Note to entry:*

Note 1 to entry: PROTECTIVE EARTH TERMINAL is most familiar to industrial users, manufacturers, etc. Therefore since this document is targeted towards industrial use, the most familiar term is utilized.

### 3.2.4

#### ENCLOSURE

*Replacement:*

*Replace the definition and NOTE with the following:*

housing affording the type and degree of protection suitable for the intended application

[SOURCE: IEC 60050-151:2001, 151-13-08]

*Add the following new terms and definitions:*

### 3.101

#### AMBIENT TEMPERATURE

temperature, determined under specified conditions, of the air surrounding the equipment

### 3.102

#### ENCLOSED EQUIPMENT

equipment which includes an ENCLOSURE, having safety capability, or a combination of an ENCLOSURE, having safety capability, and installation provisions enclosing on all sides, with the possible exception of its mounting surface, to prevent personnel from accidentally touching HAZARDOUS LIVE, hot or moving parts contained therein and meeting requirements of mechanical strength, flammability, and stability (where applicable)

EXAMPLE HAND-HELD EQUIPMENT.

Note 1 to entry: This definition is related to IEC 60050-441:1984, 441-12-02.

### 3.103

#### FIELD WIRING

wiring of the control equipment, which is not installed in the control equipment manufacturer's facility

EXAMPLE MAINS supply wiring.

### 3.104

#### INTERFACE

shared boundary between one control equipment and another control equipment, or between parts of a control equipment, through which information or electrical energy is conveyed

[SOURCE: IEC 61131-2:2017, 3.1.21]

**3.105****MODULAR EQUIPMENT**

equipment consisting of different modules such as a Rack, CPU, different I/O-modules, network modules

Note 1 to entry: MODULAR EQUIPMENT can:

- a) be OPEN EQUIPMENT or ENCLOSED EQUIPMENT;
- b) consist of modules that cannot operate alone or of a basic module that is operational alone and can be enhanced in function by additional modules;
- c) vary in size and functionality depending on the combination and the number of modules;
- d) be combined with operational equipment or enhanced in function by the addition of modules by the customer.

**3.106****OPEN EQUIPMENT**

equipment which does not protect personnel from accidentally touching HAZARDOUS LIVE or moving parts contained therein nor meet requirements of mechanical strength, flammability and stability (where applicable)

Note 1 to entry: See Annex AA.

**3.107****PANEL MOUNTED EQUIPMENT**

equipment where a portion of the equipment may form part of the ENCLOSURE

Note 1 to entry: See Figure 103.

**3.108****PORT**

access to a device or network where electromagnetic energy or signals may be supplied or received or where the device or network variables may be observed or measured

Note 1 to entry: PORT is most commonly used with respect to EMC.

**3.109****PROTECTIVE EXTRA-LOW VOLTAGE CIRCUIT****PELV CIRCUIT**

protective earth referenced electrical circuit in which the voltage cannot exceed the following:

NORMAL CONDITION and SINGLE FAULT CONDITION: The a.c. voltage levels are 30 V RMS, 42,4 V peak and the d.c. voltage level is 60 V. For equipment intended for use in WET LOCATIONS, the a.c. voltage levels are 16 V RMS, 22,6 V peak and the d.c. voltage level is 35 V

Note 1 to entry: Transients are not taken into consideration in PELV CIRCUITS.

[SOURCE: IEC 60050-195:2021, 195-06-29, modified – In the preferred term, "system" has been replaced with "circuit", a full description and clarifications have been added and the Note to entry has been replaced with a new Note to entry.]

**3.110****SAFETY EXTRA-LOW VOLTAGE CIRCUIT****SELV CIRCUIT**

non-protective earth referenced electrical circuit in which the voltage cannot exceed the following:

NORMAL CONDITION and SINGLE FAULT CONDITION: The a.c. voltage levels are 30 V RMS, 42,4 V peak and the d.c. voltage level is 60 V. For equipment intended for use in WET LOCATIONS, the a.c. voltage levels are 16 V RMS, 22,6 V peak and the d.c. voltage level is 35 V

Note 1 to entry: Transients are not taken into consideration in SELV CIRCUITS.