

Live working — Voltage detectors —

Part 3: Two-pole low-voltage type

The European Standard EN 61243-3:1998 has the status of a British Standard

ICS 13.260

National foreword

This British Standard is the English language version of EN 61243-3:1998, including corrigendum February 2002. It is identical with IEC 61243-3:1998, including corrigendum May 2000 and December 2000.

The UK participation in its preparation was entrusted to Technical Committee PEL/78, Tools for live working, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

IEC corrigendum May 2000 replaces reference to IEC 60410:1973 in Clause 2 and C.1 with ISO 2859-1:1999 and with IEC 61318:1994 in C.2. IEC corrigendum December 2000 revises the solvent used in 5.2.4.2 and adds a note about employer responsibility. CENELEC corrigendum February 2002 corrects the date of withdrawal (dow) in the Foreword.

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English version

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(IEC 61243-3:1998)

Travaux sous tension — Détecteurs de
tension —

Partie 3: Type bipolaire basse tension
(CEI 61243-3:1998)

Arbeiten unter Spannung Spannungsprüfer —

Teil 3: Zweipoliger Spannungsprüfer für
Niederspannungsnetze
(IEC 61243-3:1998)

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Foreword

The text of document 78/251/FDIS, future edition 1 of IEC 61243-3, prepared by IEC TC 78, Live working, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61243-3 on 1998-10-01.

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- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1999-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2003-07-01

Annexes designated “normative” are part of the body of the standard.

Annexes designated “informative” are given for information only.

In this standard, Annex A, Annex B, Annex C, Annex D, Annex E and Annex ZA are normative and Annex F is informative.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61243-3:1998 was approved by CENELEC as a European Standard without any modification.

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Introduction

Some low-voltage detectors have been in use for general detection of the state of electrical circuits.

The detector covered in this standard is very specific in the sense that it is not a measuring instrument. This detector complies with special requirements for live working thus providing a high level of safety to protect qualified user performing tests on electrical networks and to indicate clearly the voltage states “voltage present” and/or “voltage not present”.

1 Scope

This part of IEC 61243 is applicable to two-pole voltage detectors to be used on electrical systems for nominal voltages not exceeding 1 000 V a.c. and/or 1 500 V d.c. and below 500 Hz (nominal frequencies). The detector types are classified as follows: voltage class A: up to and including 500 V a.c./750 V d.c.; voltage class B: up to and including 1 000 V a.c./1 500 V d.c.

This part of IEC 61243 also applies to supplementary functions such as phase indications, rotating field indications, and continuity checks (see Annex E). Furthermore, it applies to accessories such as crocodile clips, detachable leads and contact electrode extensions.

Unless otherwise specified, all the voltages defined in this standard refer to phase-to-phase voltages of three-phase systems. Detectors may be used in other than three-phase systems, then the applicable phase-to-phase or phase-to-earth (ground) voltages are to be used to determine the operating voltage.

Low-voltage detectors covered by this standard are not intended to provide measurement of absolute values.

Measuring devices are excluded from this standard.

NOTE The requirements for measuring devices are specified in IEC 61010-1 and IEC 61010-2-031.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61243. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 61243 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60050(151):1978, *International Electrotechnical Vocabulary (IEV) — Chapter 151: Electrical and magnetic devices*.

IEC 60050(441):1984, *International Electrotechnical Vocabulary (IEV) — Chapter 441: Switchgear, controlgear and fuses*.

IEC 60050(601):1985, *International Electrotechnical Vocabulary (IEV) — Chapter 601: Generation, transmission and distribution of electricity — General*.

IEC 60060-1:1989, *High voltage test techniques — Part 1: General definitions and test requirements*.

IEC 60060-2:1994, *High voltage test techniques — Part 2: Measuring systems*.

IEC 60068-1:1988, *Environmental testing — Part 1: General and guidance*.

IEC 60068-2-6:1995, *Environmental testing — Part 2.6: Tests — Test Fc: Vibration (sinusoidal)*.

IEC 60068-2-32:1975, *Environmental testing — Part 2.32: Tests — Test Ed: Free fall (Procedure 1)*.

IEC 60068-2-75:1997, *Environmental testing — Part 2-75: Tests — Test Eh: Hammer tests*.

IEC 60245-4:1994, *Rubber insulated cables — Rated voltages up to and including 450/750 V — Part 4: Cords and flexible cables*.

IEC 60304:1982, *Standard colours for installation for low-frequency cables and wires*.

IEC 60364-4-41:1992, *Electrical installations of buildings — Part 4: Protection for safety — Chapter 41: Protection against electric shock*.

IEC 60364-4-47:1981, *Electrical installations of buildings — Part 4: Protection for safety — Chapter 47: Application of protective measures for safety — Section 470: General — Section 471: Measures of protection against electric shock.*

IEC 60417-1, *Graphical symbols for use on equipment — Part 1: Overview and application*¹⁾.

IEC 60479-1:1994, *Effects of current on human beings and livestock — Part 1: General aspects.*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code).*

IEC 60651:1979, *Sound level meters.*

IEC 60664-1:1992, *Insulation coordination for equipment within low-voltage systems — Part 1: Principles, requirements and tests.*

IEC 60900:1987, *Hand tools for live working up to 1 000 V a.c. and 1 500 d.c.*

IEC 61260:1995, *Electroacoustics — Octave-band and fractional-octave-band filters.*

IEC 61318:1994, *Live working — Guidelines for quality assurance plans.*

IEC 61557-7:1997, *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 — Part 7: Phase sequence.*

ISO 354:1985, *Acoustics — Measurement of sound absorption in a reverberation room.*

ISO 2859-1:1999, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection.*

ISO 3744:1994, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free-field over a reflecting plane.*

ISO 7000:1989, *Graphical symbols for use on equipment — Index and synopsis.*

ISO 9001:1994, *Quality systems — Model for quality assurance in design, development, production, installation and servicing.*

ISO 9002:1994, *Quality systems — Model for quality assurance in production, installation and servicing.*

CISPR 14-1:1993, *Electromagnetic compatibility — Requirements for household appliances, electric tools and similar apparatus — Part 1: Emission — Product family standard.*

3 Definitions

For the purpose of this part of IEC 61243 the following definitions apply.

3.1

two-pole voltage detector (detector)

portable device for two-pole application, used to detect or signal the presence or the absence of voltage

3.2

test probe

insulated part of a detector used in handling contact electrode. It may contain components for application and testing

3.3

indicator

part of the detector which indicates the presence or absence of voltage at the contact electrode within the nominal voltage range

3.4

contact electrode

bare conductive part which establishes the electrical connection to the component, system, or installation to be tested

¹⁾ To be published.

3.5**contact electrode extension**

externally insulated conductive section between the indicator and the contact electrode

3.6**hand-guard**

distinctive physical barrier (fixed to or part of the test probe) to prevent the fingers or hands of the operator from inadvertently touching the contact electrode or any energized part

3.7**redundant indicating system**

second individual indicating system, arranged to be independent of each other in operation

3.8**internal energy source**

integrated functional power supply necessary for the correct operation of the detector

3.9**testing element**

built-in element or external device, by means of which the functioning of the detector can be checked by the user

3.10**phase indicator**

part of the detector which indicates the phase and/or the neutral conductor of a live system

3.11**accessible electrode**

single conductive part of the detector designed to be touched by the finger or the hand in order to activate the phase indication

3.12**rotating field indication**

part of the detector which indicates the phase sequence of a three phase system

3.13**successive indication**

function in form of separate level indicators (e.g. lamps or light-emitting diodes — LEDs) for a step by step indication, that provides notice of the value of the indicated voltage

3.14**continuity test**

function which determines whether an electric circuit is continuous

3.15**measuring display**

function in form of an analogue or digital display, that provides notice of the value of the indicated voltage such displays are for indication only, they are not intended to provide measurement of absolute values

3.16**nominal voltage (U_n)**

suitable approximate voltage value used to identify a system or device [IEV 601-01-21]

the nominal voltage of the detector is the parameter associated with its clear indication. Certain types of detectors may have several nominal voltages or nominal voltage ranges. Limit values of a voltage range are named U_n min. and U_n max.

3.17**threshold voltage (U_t)**

minimum voltage between the live component and earth (ground) required to give a clear indication corresponding to specific conditions, as defined in a corresponding test

NOTE In practical use the criterion of this definition is applicable for a voltage detection between two live components for determination of the voltage state.

3.18

extra low voltage (ELV)

voltages below the safe values 50 V a.c. and 120 V d.c.

3.19

operating current

minimum value of current required to operate the different indicating systems

3.20

leakage current

maximum current measured at any point on the operator side of the hand-guard at the maximum nominal voltages of the detector (a.c. and d.c.)

3.21

current and voltage limiting element or protective impedance device

element or device that limits the steady-state or discharge current or surge voltage to safe values (see IEC 60479), throughout the life of the equipment when used under the electric stresses specified in the event of any likely component failure (see 4.3.6)

3.22

duty ratio

ratio of the onload duration to total time for a given interval

3.23

response time

time delay between a sudden change of the voltage state on the contact electrode and the associated clear indication

3.24

stand-by state

state at which the detector is ready to work correctly at the threshold voltage without manual switching

3.25

clear indication

unambiguous detection or indication of the change of the voltage state at the defined threshold voltage

3.26

clear perceptibility

case where the indication is unmistakably discernible by the user under specific environmental conditions when the detector is in its operating position

3.27

indoor type

detector designed for use in dry conditions, normally indoors

3.28

outdoor type

detector designed for use in wet conditions, both indoor and outdoor

3.29

type test

test on one or more devices of a certain design to show that the design meets established specifications [IEV 151-04-15] (see Annex A)

3.30

routine test

test to which each individual device is subjected after manufacture to ascertain whether it complies with established criteria. [IEV 151-04-16] (see Annex C)

3.31

sampling test

test on a number of devices taken at random from a batch [IEV 151-04-17] (see Annex C)

3.32**acceptance test**

contractual test to prove to the customer that the device meets certain requirements of its specification [IEV 151-04-20] (see Annex F)

NOTE Additional tests to this standard may be set up between customer and manufacturer.

4 Requirements**4.1 General****4.1.1 Safety**

Detectors shall be designed and manufactured to cause no danger to the user provided they are used in safe working conditions and in accordance with the instructions for use, even if the detectors or any of the supplementary functions are used in case of faults on systems with nominal voltages energized up to and including 1 000 V a.c. or 1 500 V d.c.

4.1.2 Influence of frequency

All the functions of the detector shall operate at all nominal frequencies.

4.1.3 Radio interference

Detectors shall comply with the requirements of CISPR 14 according to duty ratio (see 4.2.2).

NOTE In some countries additional requirements should be added to fulfil EMC-regulations (electromagnetic compatibility).

4.2 Functional requirements**4.2.1 Clear indication**

Detectors shall clearly indicate at nominal frequencies the voltage states “voltage present” and/or “voltage not present” above ELV limit indication of:

- every nominal voltage;
- every nominal voltage range; and
- every step within a nominal voltage range (see 4.2.3).

An audible indication is optional.

The voltage range for clear indication, except indication of ELV limit indication, shall be limited to $0,85 U_n \text{ min.} \leq U_n \leq 1,1 U_n \text{ max.}$

4.2.1.1 The ELV limit indication shall be clearly indicated at all nominal frequencies.

NOTE The ELV limit indication is only to warn the user of the presence of a dangerous voltage, not for its measurement.

4.2.1.2 The threshold voltage U_t for each voltage range shall satisfy the following relationship:

$$U_t \leq 0,85 U_n$$

The threshold voltage U_t shall be equal to the values 50 V a.c. and 120 V d.c. for the ELV limit indication.

4.2.1.3 The circuitry, even capacitive devices, shall be so designed, that only in case of positive contact with a bare exposed conductor of the component under test the operating voltage shall be indicated by the detector.

4.2.1.4 Detectors, which require an operating current greater than 3,5 mA a.c. or 10 mA d.c. (in accordance with IEC 60479) at the maximum nominal voltage of the voltage range, shall have contact electrodes with protection against accidental contact by the user at least according to IP2X (see IEC 60529) when they are not in use. An indicating circuit may be alternatively activated by a push button (see IEC 441-14-53) in each test probe.

4.2.1.5 Visible indication shall not be hidden in normal use.

The normal position(s) of use shall be described in the instructions for use supplied by the manufacturer of the detector and supplementary functions.

4.2.1.6 In normal use the audible emission level shall be at least the minimum.