

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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 12: Performance measuring and monitoring devices (PMD)

Sécurité électrique dans les réseaux de distribution basse tension de 1 000 V c.a. et 1 500 V c.c. – Dispositifs de contrôle, de mesure ou de surveillance de mesures de protection –

Partie 12: Dispositifs de mesure et de surveillance des performances (PMD)



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Partie 12: Dispositifs de mesure et de surveillance des performances (PMD)**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**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 12: Performance measuring and monitoring devices (PMD)

FOREWORD

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

FDIS	Report on voting
85/311/FDIS	85/312/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.

This standard is to be used in conjunction with IEC 61557-1 (unless otherwise specified).

A list of all parts of the IEC 61557 series, published under the general title *Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. – Equipment for testing, measuring or monitoring of protective measures*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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- withdrawn,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.

Withdawn

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INTRODUCTION

As a complement to protection measures, it becomes more and more necessary to measure different electrical parameters, in order to monitor the required performances in energy distribution systems due to:

- installation standards evolutions, for instance over current detection is now a new requirement for the neutral conductor due to harmonic content;
- technological evolutions (electronic loads, electronic measuring methods, etc.);
- end-users needs (cost saving, compliance with aspects of building regulations, etc..);
- safety and continuity of service;
- sustainable development requirements where energy measurement for instance is recognised as an essential element of energy management, part of the overall drive to reduce carbon emissions and to improve the commercial efficiency of manufacturing, commercial organisations and public services.

The devices on the current market have different characteristics, which need a common system of references. Therefore there is a need for a new standard in order to facilitate the choices of the end-users in terms of performance, safety, interpretation of the indications, etc. This standard provides a basis by which such devices can be specified and described, and their performance evaluated.

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WITHDRAWN

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 12: Performance measuring and monitoring devices (PMD)

1 Scope

This part of IEC 61557 specifies requirements for combined performance measuring and monitoring devices that measure and monitor the electrical parameters within electrical distribution systems. These requirements also define the performance, in single and three-phase a.c. or d.c. systems having rated voltages up to 1 000 V a.c. or up to 1 500 V d.c.

These devices are fixed installed or portable. They are intended to be used indoors and/or outdoors. This standard is not applicable for:

- electricity metering equipment that complies with IEC 62053-21, IEC 62053-22 and IEC 62053-23. Nevertheless, uncertainties defined in this standard for active and reactive energy measurement are derived from those defined in the IEC 62053 standards series.
- simple remote relays or simple monitoring relays.

This standard is intended to be used in conjunction with IEC 61557-1 (unless otherwise specified), which specifies the general requirements for measuring and monitoring equipment, as required in IEC 60364-6.

The standard does not include the measurement and monitoring of electrical parameters defined in Parts 2 to 9 of IEC 61557 or in IEC 62020.

Combined performance measuring and monitoring devices (PMD), as defined in this standard, give additional safety information, which aids the verification of the installation and enhances the performance of the distribution systems. For instance, those devices help to check if the level of harmonics is still compliant with the wiring systems as required in IEC 60364-5-52.

The combined performance measuring and monitoring devices (PMD) for electrical parameters described in this standard are used for general industrial and commercial applications. A PMD-A is a specific PMD complying with requirements of IEC 61000-4-30 class A, which may be used in "power quality assessment" applications.

NOTE 1 Generally such types of devices are used in the following applications or for the following general needs:

- energy management inside the installation;
- monitoring and/or measurement of electrical parameters that may be required or usual;
- measurement and/or monitoring of the quality of energy.

NOTE 2 A measuring and monitoring device of electrical parameters usually consists of several functional modules. All or some of the functional modules are combined in one device. Examples of functional modules are mentioned below:

- measurement and indication of several electrical parameters simultaneously;

- energy measurement and/or monitoring, and also sometimes compliance with aspects of building regulations;
- alarms functions;
- power quality (harmonics, over/undervoltages, voltage dips and swells, etc).

2 Normative references

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

IEC 60068-2-1, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2, *Environmental testing – Part 2: Tests – Tests B: Dry heat*

IEC 60068-2-30, *Environmental testing – Part 2-30 – Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60364-6, *Low-voltage electrical installations – Part 6: Verification*

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

IEC 61000-4-5, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-15, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 15: Flickermeter – Functional and design specifications*

IEC 61000-4-30:2003, *Electromagnetic compatibility (EMC) – Part 4-30: Testing and measurement techniques – Power quality measurement methods*

<https://www.intertek.com/standards/iec/61557-12-2007>
IEC 61010 (all parts), *Safety requirements for electrical equipment for measurement, control, and laboratory use*

IEC 61010-1:2001, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*

IEC 61326-1:2005, *Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements*

IEC 61557-1:2007, *Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 1: General requirements*

IEC 62053-21:2003, *Electricity metering equipment (a.c.) – Particular requirements – Part 21: Static meters for active energy (classes 1 and 2)*

IEC 62053-22:2003, *Electricity metering equipment (a.c.) – Particular Requirements – Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)*

IEC 62053-23:2003, *Electricity metering equipment (a.c.) – Particular requirements – Part 23: Static meters for reactive energy (classes 2 and 3)*

IEC 62053-31:1998, *Electricity metering equipment (a.c.) – Particular requirements – Part 31: Pulse output devices for electromechanical and electronic meters (two wires only)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61557-1, unless otherwise specified in this standard, and the following terms and definitions apply.

3.1 General definitions

3.1.1 performance measuring and monitoring device PMD

combination in one or more devices of several functional modules dedicated to measuring and monitoring electrical parameters in energy distribution systems or electrical installations. A PMD can be used in connection with sensors (see 4.3)

A PMD that complies with class B as defined in IEC 61000-4-30 is also covered by this definition.

NOTE 1 Under the generic term “monitoring” are also included functions of recording, alarm management etc.

NOTE 2 These devices may include power quality functions.

3.1.2 PMD-A

PMD in which all power quality assessment functions comply with measurement methods and performance requirements according to class A of IEC 61000-4-30 and with complementary requirements (safety, EMC, temperature range, complementary influence quantities, ...) of this standard

NOTE If this device is used for checking the compliance to the connection agreement with a network operator, it should be installed at the interface point between the installation and the network.

3.1.3 power quality assessment functions

power quality functions whose measurement methods are defined in IEC 61000-4-30

3.1.4 specified external sensor

sensor that is chosen in such a way that, connected to a PMD without sensors, the system performance class complies with 4.4.2

3.1.5 current sensor CS

electrical, magnetic, optical or other device intended to transmit a signal corresponding to the current flowing through the primary circuit of this device

NOTE A current transformer (CT) is in general a magnetic current sensor.

3.1.6 compliance voltage

value of the voltage that can be developed at the output of a current generator while conforming to the requirement of the uncertainty specification for that output

NOTE This definition applies to current analogue output signals.

**3.1.7
voltage sensor
VS**

electrical, magnetic, optical or other device intended to transmit a signal corresponding to the voltage across the primary terminals of this device

NOTE A voltage transformer (VT) is in general a magnetic voltage sensor.

**3.1.8
self-powered PMD**

equipment able to work without an auxiliary power supply

NOTE 1 Self powered PMD have no provision for power supply terminals.

NOTE 2 Self powered PMD includes equipment powered from measurement inputs, internal batteries, or other internal power sources (internal photo-voltaic sources, etc.).

**3.1.9
auxiliary power supply**

external power supply, either a.c. or d.c. that powers the PMD through dedicated terminals separated from the measurement inputs of the PMD

3.2 Definitions related to uncertainty and performance

**3.2.1
reference conditions**

appropriate set of specified values and/or ranges of values of influence quantities under which the smallest permissible uncertainties of a measuring instrument are specified

NOTE The ranges specified for the reference conditions, called reference ranges, are not wider, and are usually narrower, than the ranges specified for the rated operating conditions.

[IEC 60359, definition 3.3.10]

**3.2.2
intrinsic uncertainty**

uncertainty of a measuring instrument when used under reference conditions. In this standard, it is a percentage of the measured value defined in its rated range and with the other influence quantities under reference conditions, unless otherwise stated

[IEC 60359, definition 3.2.10, modified]

**3.2.3
influence quantity**

quantity which is not the subject of the measurement and whose change affects the relationship between the indication and the result of the measurement

NOTE 1 Influence quantities can originate from the measured system, the measuring equipment or the environment [IEV].

NOTE 2 As the calibration diagram depends on the influence quantities, in order to assign the result of a measurement it is necessary to know whether the relevant influence quantities lie within the specified range [IEV].

[IEC 60359, definition 3.1.14 modified]

**3.2.4
variation (due to a single influence quantity)**

difference between the value measured under reference conditions and any value measured within the influence range

NOTE The other performance characteristics and the other influence quantities should stay within the ranges specified for the reference conditions.