

INTERNATIONAL STANDARD



Electrical safety in low voltage distribution systems up to 1 000 V AC and
1 500 V DC. – Equipment for testing, measuring or monitoring of protective
measures –
Part 12: **Performance measuring** Power metering and monitoring devices (PMD)

IEC 61557-12:2018

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRICAL SAFETY IN LOW VOLTAGE DISTRIBUTION
SYSTEMS UP TO 1 000 V AC AND 1 500 V DC. –
EQUIPMENT FOR TESTING, MEASURING OR
MONITORING OF PROTECTIVE MEASURES –****Part 12: ~~Performance measuring~~ Power metering and
monitoring devices (PMD)**

FOREWORD

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International Standard IEC 61557-12 has been prepared by IEC technical committee 85: Measuring equipment for electrical and electromagnetic quantities.

This second edition cancels and replaces the first edition published in 2007. This edition constitutes a technical revision.

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

- a) PMD-A has been withdrawn due the fact these devices are now mainly covered by the IEC 62586 series of standards.
- b) Three categories of PMD have been created with a list of minimum required functions for each category.
- c) Added a new Annex A explaining the different applications linked to the relevant standards and devices, and another new Annex C about the power factor conventions.

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

FDIS	Report on voting
85/644/FDIS	85/649/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61557 series, published under the general title *Electrical safety in low voltage distribution systems up to 1 000 V AC and 1 500 V DC – 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 document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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The contents of the corrigendum 1 (2022-09) only applies to the French version.

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;~~

Energy distribution systems need to guarantee energy efficiency, availability and network performances in order to address the following challenges:

- 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 organizations and public services;
- technological evolutions (electronic loads, electronic measuring methods, etc.);
- end-users needs (cost saving, compliance with aspects of building regulations, etc.) regarding electrical energy management as well as other energies, or fluids. Other functionalities involving several non electrical parameters are often needed in parallel;
- safety and continuity of service;
- evolution of installation standards, for instance over-current detection is now a new requirement for the neutral conductor due to harmonic content.

Monitoring electrical quantities in internal networks allows to address these challenges.

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

In order to fulfil the requirements of the energy efficiency project, many PMD measuring electrical parameters can also collect data (water, air, gas, temperature...) coming from other sensors or meters inside building or plant areas. In order to be able to transmit all these data to a supervision software it will be relevant to equip the PMD with a communication bus. The supervision software will then manage all the collected data in order to monitor them and produce useful reports for energy usage and consumption analysis.

ELECTRICAL SAFETY IN LOW VOLTAGE DISTRIBUTION SYSTEMS UP TO 1 000 V AC AND 1 500 V DC. – EQUIPMENT FOR TESTING, MEASURING OR MONITORING OF PROTECTIVE MEASURES –

Part 12: ~~Performance measuring~~ Power metering and monitoring devices (PMD)

1 Scope

This part of IEC 61557 specifies requirements for ~~combined performance measuring~~ power metering and monitoring devices (PMD) that measure and monitor the electrical ~~parameters~~ quantities within electrical distribution systems, and optionally other external signals. These requirements also define the performance in single- and three-phase AC or DC systems having rated voltages up to 1 000 V AC or up to 1 500 V DC.

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.~~

IEC 61557-12:2018

~~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~~ Power metering and monitoring devices (PMD), as defined in this document, give additional safety information, which aids the verification of the installation and enhances the performance of the distribution systems. ~~For instance, these 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~~ power metering and monitoring devices (PMD) for electrical parameters described in this document 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.~~

This document does not address functional safety and cyber security aspects.

This document is not applicable for:

- electricity metering equipment that complies with IEC 62053-21, IEC 62053-22, IEC 62053-23 and IEC 62053-24. Nevertheless, uncertainties defined in this document for active and reactive energy measurement are derived from those defined in IEC 62053 (all parts);
- the measurement and monitoring of electrical parameters defined in IEC 61557-2 to IEC 61557-9 and IEC 61557-13 or in IEC 62020;
- power quality instrument (PQI) according IEC 62586 (all parts);

- devices covered by IEC 60051 (all parts) (direct acting analogue electrical measuring instrument).

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

- energy management inside the installation, such as facilitating the implementation of documents such as ISO 50001 and IEC 60364-8-1;
- monitoring and/or measurement of electrical parameters ~~that may be required or usual~~;
- measurement and/or monitoring of the quality of energy inside commercial/industrial installations.

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~~ monitoring of several electrical parameters simultaneously;
- energy measurement and/or monitoring, as well as sometimes compliance with aspects of building regulations;
- alarms functions;
- ~~power~~ demand side quality (current and voltage harmonics, over/under voltages, voltage dips and swells, etc.).

NOTE 3 PMD are historically called power meter, power monitor, power monitor device, power energy monitoring device, power analyser, multifunction meter, measuring multifunction equipment, energy meters.

NOTE 4 Metering, measuring and monitoring applications are explained in Annex A.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 2015, *Electromagnetic compatibility (EMC) – Part 4-30: Testing and measurement techniques – Power quality measurement methods*

~~IEC 61010 (all parts), Safety requirements for electrical equipment for measurement, control, and laboratory use~~

IEC 61010-1:2004 2010, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*

IEC 61010-1:2010/AMD1:2016