



# Embedding IEC 61557-12 measurement functions in electrical equipment

## Power Metering and Monitoring Functions (PMF)

### The IEC 61557-12 standard for PMDs

The IEC 61557-12 standard *Power metering and monitoring devices (PMD)* specifies requirements for measuring devices called PMDs, also known as power meters, multifunction meters, power analyzers, etc. Those devices are standalone devices whose main function is to measure electrical quantities (powers, energies, current, voltage, harmonic distortion, unbalance, etc.).

The main performance requirement for the measurement of a given measured electrical quantity is specified as a performance class, which defines the accuracy over a specified measurement range, with good robustness when influence quantities (temperature, radiofrequency disturbances, etc.) are present.



Compliance to IEC 61557-12 is verified by comprehensive tests. This guarantees that a PMD will deliver accurate measurements in real-world electrical environments (switchboard, cabinets...). PMD is also compliant to Safety and EMC standards.

For more information, see [IEC 61557-12 | The 10 Key questions](#), a supporting document available from the IEC TC85 website.

### Measurement functions embedded in other devices

A measurement function can also be embedded into a device whose main function is not electrical measurement such as:

- a Circuit Breaker,
- a Programmable Logic Controller (PLC)
- a Residual Current Device (RCD)
- .../...

Each of these devices complies to a product standard, and often to other standards for safety, Electro-Magnetic Compatibility, etc.

In most cases, the embedded measurement functions do not comply with a measurement performance standard like IEC 61557-12, because measurement is not part of the product's "core functions."

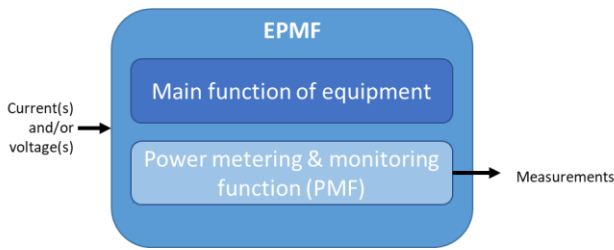
The question that arises then is: *how accurate is this embedded measurement function, over which range, and under which conditions?*

### New Annex H of IEC 61557-12:2021 for Power Metering and Monitoring Functions (PMF)

To answer this question, the IEC 61557-12 standard has incorporated a new amendment which was published in 2021.

If the quality and robustness of the embedded measurement functions is seen as an added value, the Amendment including Annex H to IEC 61557-12, published in 2021, proposes a solution for product manufacturers willing to claim a measurement

performance class for the measurement functions embedded in their products.



**High-level functional architecture of an EPMF**

The new annex H specifies:

- Requirements for *Power metering and monitoring functions* (PMF)
- Additional requirements for *equipment embedding a PMF* (EPMF)

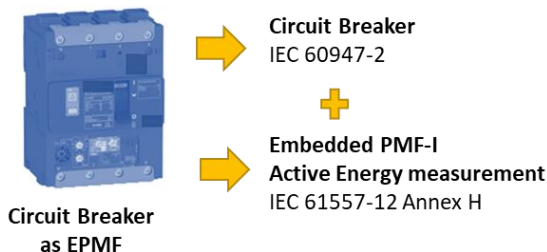
More specifically, Annex H specifies, by analogy with PMDs:

- Types of PMF (PMF-I to PMF-III), each with a minimum set of required measurements
- Applicable performance classes and related accuracy requirements and tests for each measured quantity, identical to the performance classes of PMDs

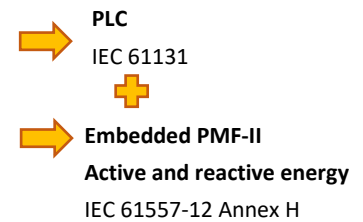
For requirements not related to the accuracy of the measurement functions (e.g. safety or EMC, ...) the product standard of the device applies.

## Examples of EPMF

The figures below illustrate examples of electrical devices as equipment embedding power metering and monitoring function(s).



**PLC as EPMF**



## Benefits of compliance to IEC 61577-12 for embedded measurement functions

Embedded measurement functions compliant with Annex H of IEC 61557-12 provide the following advantages:

- Warranted performance accuracy for all measured electrical quantities
- Well-defined reference conditions for testing the performance of the measurement function
- Specified measurement range with guaranteed accuracy
- Tolerance to the effects of influence quantities like temperature, harmonics...

These advantages make sure that the equipment, although not a PMD in essence, will deliver similarly trustworthy and robust measurements in real-world electrical environments.

## About this document

The members of IEC TC 85 / WG20 have prepared this supporting document.

This document aims to provide an overview of the benefits of IEC 61557-12 Annex H to stakeholders not familiar with this Annex.

This document does not replace the official standard IEC 61557-12:2018 and its amendment published in 2021 for Annex H.

For more information about the different standards noted in this supporting document, see [IEC Webstore](#).

**Version 1.2, April 2023**