



UNIPOWER

IEC 61000-4-30 Ed. 4

In progress state FDIS
Member of WG9

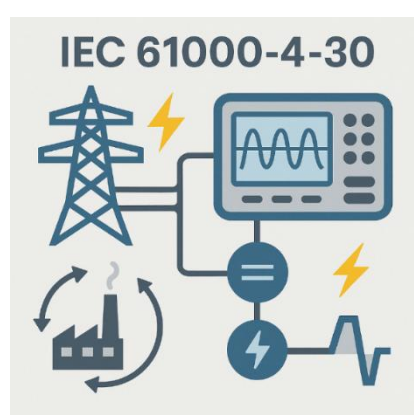
Jonny Carlsson
Research Manager
Unipower AB

www.unipower.se

Jonny.carlsson@unipower.se

Why IEC 61000-4-30 matters

- IEC 61000-4-30 is the international standard that defines how to measure and interpret power-quality (PQ) parameters in 50/60 Hz AC power systems so that results are **repeatable**, **reliable** and **comparable** across different instruments.



Example of RMS measurements methods

1. Average-responding, RMS-calibrated voltmeter

Measures the average value of a rectified AC waveform, then scales it to display RMS.
Works correctly only for pure sine waves.

2. True RMS voltmeter (thermal type)

Converts the input voltage to heat (e.g., using a thermocouple or hot-wire).
The heating effect is proportional to the RMS value.

Advantage: Accurate for any waveform (sine, square, distorted, etc.).

3. True RMS voltmeter (electronic type)

Uses analog RMS-to-DC converter circuits (e.g., based on analog multipliers, log/antilog circuits).

4. Digital True RMS meters (ADC-based)

Use sigma-delta ($\Delta\Sigma$) or high-resolution ADCs with DSP (digital signal processing) to compute RMS directly.

- Integration / aggregation

Why IEC 61000-4-30 was created

- PQ Instruments connected to the same signal, provided different readings. This caused uncertainties between net owners and users of electrical energy.
- When legal concern became more important. The demand for defined measurement methods increased.
- A standard was necessary.
- The goal, to defines comparable, repeatable methods to measure power quality (PQ) parameters.

History IEC 61000-4-30

- 2003 Edition 1.0 published. First international method for in-situ PQ measurements at 50/60 Hz. defines key PQ parameters and aggregation concepts.
- 2008 Edition 2.0: clarifies Class A/B; introduces Class S; adds guidance Annex C.
- 2015 Edition 3.0 (consolidated to Ed.3.1 in 2021): adds RVC; current method normative; 2–150 kHz informative; under/over-deviation and Class B to informative; references IEC 62586-2 for tests procedures.
Ed. 3: Used "measurement uncertainty" in each chapter.
- 2025 — Edition 4.0 (FDIS/PRV):

What's new in IEC 61000-4-30 Ed. 4

- Integrates COR1:2016 and A1:2021 from Ed.3.
- Corrects & extends RVC measurement method.
- Updates & extends voltage sag/swell methods.
- Splits high-frequency conducted emissions into:
 - 2–9 kHz (Annex C) and 9–150 kHz (new Annex D).
- Removes Annex D (under/over-deviation) and removes Annex E (Class B) → only Class A and Class S remain.
- Voting window 2025-08-08 → 2025-09-19; publication as Ed.4.0 expected thereafter.
- Ed. 4: Use "Maximum Permissible Error (MPE)" for all PQ-parametrar.

What's new in IEC 61000-4-30 Ed. 4

Ed 3. Measurement Uncertainty Definition: Describes the doubt about the result of a measurement. It is a quantified range around the measured value within which the true value is believed to lie, with a given level of confidence (often 95%). Purpose: Comes from calibration, instrument resolution, environmental factors, operator influence, and statistical analysis. It reflects the quality of the measurement process.

Ed 4. Permissible Error (MPE) Definition: A tolerance limit specified in a standard, regulation, or specification for how far a measurement is allowed to deviate from the true value. It is a **requirement** (not an estimate) that instruments must meet to be legally or technically acceptable. Expressed as an absolute limit (e.g., $\pm 1\%$ of reading, ± 0.2 V, etc.). Purpose: Ensures instruments are within acceptable performance boundaries. **It is externally imposed (by IEC, ISO, national metrology laws, etc.).**

Classes across editions

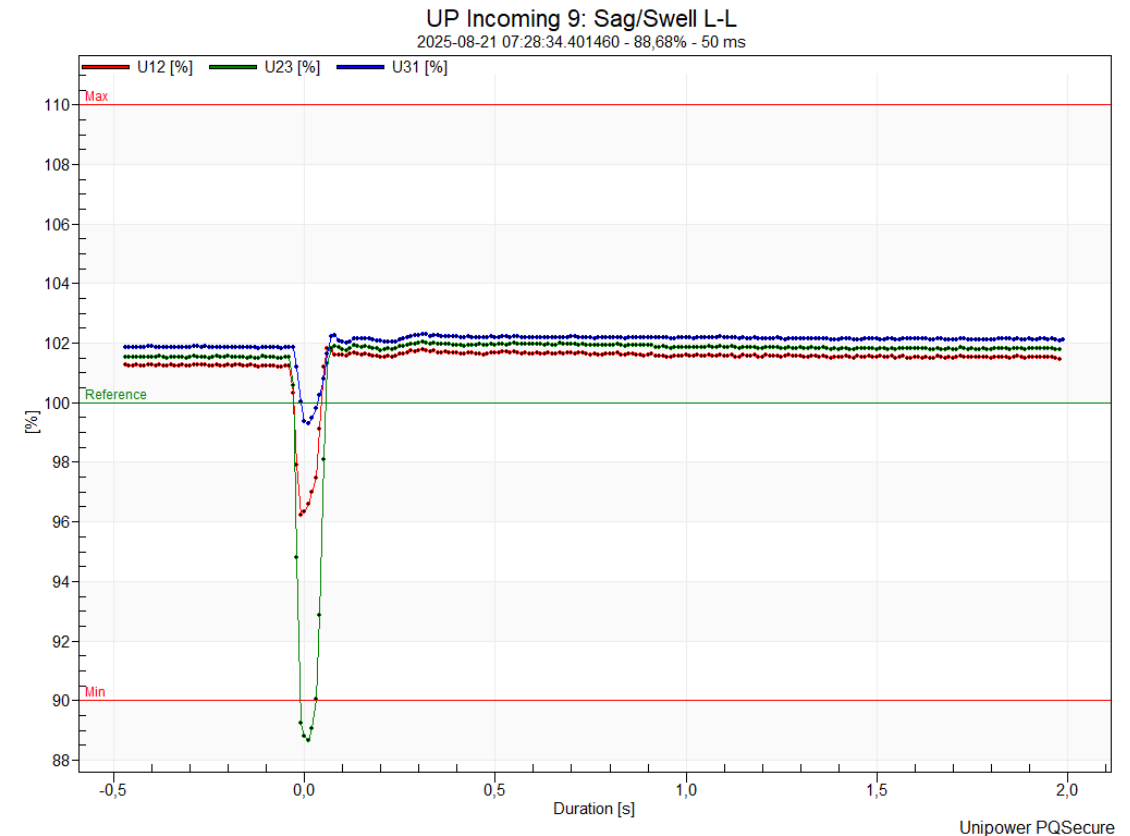
Class A 'Advanced': precise, dispute-resolving; comparable results across instruments.

Class S 'Surveys': lower processing requirements for statistical/survey work (added in 2008).

Class B 'Basic': legacy path in Ed.1–Ed.2; relegated to informative Annex E in Ed.3 and removed in Ed.4 PRV.

IEC 61000-4-30

- Power Frequency
- Magnitude of Supply Voltage
- Flicker, IEC 61000-4-15
- Unbalance
- Harmonics, IEC 61000-4-7
- Interharmonics
- Mains Signalling
- Supply Sag/Swell
- Voltage Interruptions
- Rapid Voltage Change (RVC)



IEC 61000-4-30 Ecosystem and conformity

IEC 61000-4-7 Harmonics & interharmonics methods / instrumentation.

IEC 61000-4-15 Flickermeter functional & design specifications.

IEC 62586-1 PQ instruments (EMC, safety, environmental).

IEC 62586-2 Test & uncertainty methods to validate Class A performance.



Measurement 2kHz-150kHz

This frequency range is applicable for low voltage applications.

- Variable speed drives and other switching equipment create noise at higher frequencies
- PLC communication and other equipment can be disturbed
- Fast chargers for electrical vehicle.
- Many questions still remain to be clarified



UNIPOWER

Power Quality Management System

Jonny Carlsson
Research Manager
Unipower AB

www.unipower.se
Jonny.carlsson@unipower.se

