What does Class A mean to me?

Application Note

Power quality measurement is still a relatively new and quickly evolving field. Whereas basic electrical measurements like RMS voltage and current were defined long ago, many power quality parameters have not been previously defined, forcing manufacturers to develop their own algorithms. Now there are hundreds of manufacturers around the world with unique measurement methodologies. With so much variability between instruments, technicians often must spend time trying to understand the instrument's capabilities and measurement algorithms instead of understanding the quality of the power itself.

The new IEC 61000-4-30 CLASS A standard takes the guesswork out of selecting a power quality instrument.

The standard IEC 61000-4-30 CLASS A defines the measurement methods for each power quality parameter to obtain reliable, repeatable and comparable results. It also defines the accuracy, bandwidth, and minimum set of parameters. Going forward, manufacturers can begin designing to Class A standards, giving technicians a level playing field to choose from and increasing their measurement accuracy, reliability, and efficiency on the job.

IEC 6100-4-30 Class A standardizes measurements of:

- Power frequency
- Supply voltage magnitude
- Flicker, harmonics, and interharmonics (by reference)
- Dips/sags and swells
- Interruptions
- Supply voltage unbalance
- Mains signalling
- Rapid voltage changes

It does not standardize measurements of high frequency transients or current-related phenomena.

Examples of Class A requirements

- **Measurement uncertainty** is set at 0.1 % of declared input voltage. Low cost power quality measurement systems with uncertainties greater than 1 % can erroneously detect dips at -9 % when the threshold is set at -10 %. With a Class A certified instrument, a technician can confidently classify events with internationally accepted uncertainty. This is important when verifying compliance to regulations or comparing results between instruments or parties.
- **Dips, swells and interruptions** must be measured on a full cycle and updated every half cycle, enabling the instrument to combine the high resolution of half-cycle sampled data points with the accuracy of full-cycle RMS calculations.
- **Aggregation windows** – A power quality instrument compresses acquired data at specified periods which are called aggregation windows. A Class A instrument must provide data in following aggregation windows:
  - 10/12 cycle (200 msec) at 50/60 Hz, interval time varies with actual frequency
  - 150/180 cycles (3 sec) at 50/60 Hz, interval time varies with actual frequency
  - Harmonics must be measured with 200 ms intervals according to the new standard IEC 61000-4-7 / 2002. The old standard allowed 320 ms intervals which cannot be synchronized with the 200 ms aggregation windows of other Class A measurements.

Using 200 ms intervals allows harmonic calculations to be synchronous to all the other values like **RMS**, **THD**, and **unbalance**.

- **The Harmonics FFT algorithm** is specified exactly such that all Class A instruments will arrive at the same harmonic magnitudes. The FFT methodology allows for infinite algorithms that can result in vastly different harmonic magnitudes. By standardizing on 5 Hz bins and summing the harmonics and interharmonics according to specific rules, Class A instruments will be consistent and comparable.
- **External time synchronization** is required to achieve accurate timestamps, enabling accurate correlation of data between different instruments. Accuracy is specified with ± 20 ms for 50 Hz and ± 16.7 ms for 60 Hz instruments.
  - 10 min interval sync to clock
  - 2 h interval sync to clock

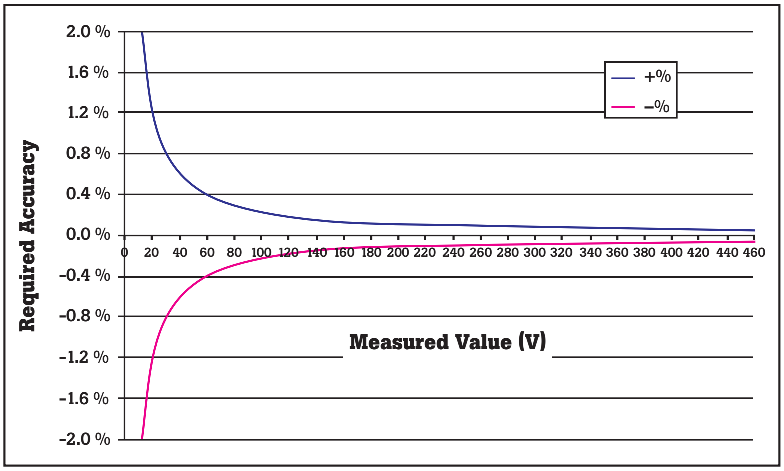

Figure 1: This graph illustrates how .1 % of declared input voltage uncertainty impacts the accuracy of a measured voltage. Note how at 230 V the uncertainty is 0.1 %.

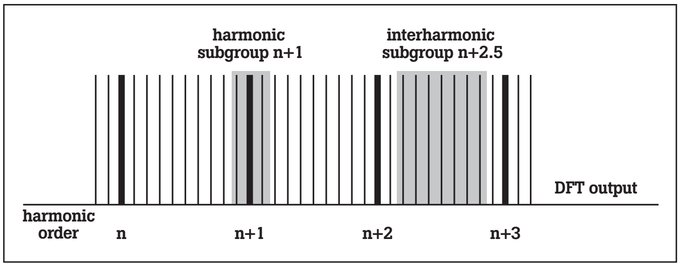

Figure 2: This graph illustrates how FFT bins are summed to calculate harmonic and interharmonic magnitudes.

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