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## Technical Bulletin:

### IEEE 519 Compliance and Harmonic Measurement Strategies for DENT PowerScout Meters

#### **Summary:**

*Rogowski Coils are only recommended for installations within IEEE 519-2014 limits ( $<8\%$  THD); for THD above 8%, use Metal-Core CTs or Rogowski Coils with Integrated Electronics.*

#### **Purpose and Design Intent**

DENT's PowerScout family of energy meters were engineered from the outset to align with IEEE 519-2014 harmonic recommendations. At a nominal input of 600 VAC ( $\leq 1$  kV), IEEE 519 permits up to 8 % Total Harmonic Distortion (THD) at the Point of Common Coupling (PCC). While the PowerScout is designed to far exceed this limit with iron core CTs, the threshold of 8% THD does apply when using Rogowski Coils.

#### **Background on IEEE 519 and THD Limits**

IEEE 519-2014 establishes maximum voltage distortion limits based on system voltage. For systems at or below 1 kV—such as those monitored by PowerScout meters—the standard caps THD at 8 %. This limit exists to protect utility and end-user equipment from excessive harmonic voltages, while still permitting the widespread adoption of modern nonlinear loads like variable-speed drives and diode rectifiers.

#### **Why High THD Affects CT Accuracy**

When THD rises above the design threshold—found in facilities with heavy nonlinear loading—current transformers (CTs) can distort harmonic content in their secondary outputs. Traditional metal-core CTs rely on magnetic coupling and may begin to saturate, skewing both magnitude and phase of higher-order harmonics once distortion exceeds roughly 10 %–15 %. In contrast, Rogowski coils feature an air-core winding that captures rapid current changes without saturation, but require accurate integration circuitry to reconstruct the true current waveform.

#### **Maintaining Accuracy Beyond 8 % THD**

For installations where THD exceeds IEEE 519's 8 % limit, DENT recommends either:

1. **Metal-Core CTs** engineered for flat response well into the 50th harmonic order, such as those supplied by DENT Instruments, or
2. **Rogowski Coils** with Integrated Electronics, whose wide bandwidth and linearity preserve accuracy even at THD levels above 20 %.

Both options will ensure that the PowerScout meter continues to deliver precise RMS and accurate readings under extreme distortion conditions.

#### **References and Support**

- IEEE Std 519-2014, *Recommended Practice and Requirements for Harmonic Control in Electric Power Systems*
- For further assistance with CT selection, integrator setup, or calibration details, please contact DENT Technical Support.

