Total Power in Three-Phase AC Circuits
Program Note No. 3

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07 / 31 / 2019

Total Power Formulas for Three-Phase AC Circuits

As written in Program Note No. 2 (*Power Calculations in AC Circuits*) there are two components of power: active and reactive.

$$Active\ Power = V_{RMS}I_{RMS}\cos(\theta_V - \theta_I)$$
$$Reactive\ Power = V_{RMS}I_{RMS}\sin(\theta_V - \theta_I)$$

In a three-phase circuit the total power is the equal to the sum of the components of each phase.

$$Total\ Active\ Power = P_{Aa} + P_{Ba} + P_{Ca}$$
$$Total\ Reactive\ Power = P_{Ar} + P_{Br} + P_{Cr}$$

Where, P_{Aa} is the active power of phase A and, P_{Ar} is the reactive power of phase A. An example of how to calculate total active and reactive power using Wavewin is shown below.

Step 1: Isolate the voltage and current channels for phases A, B and C.
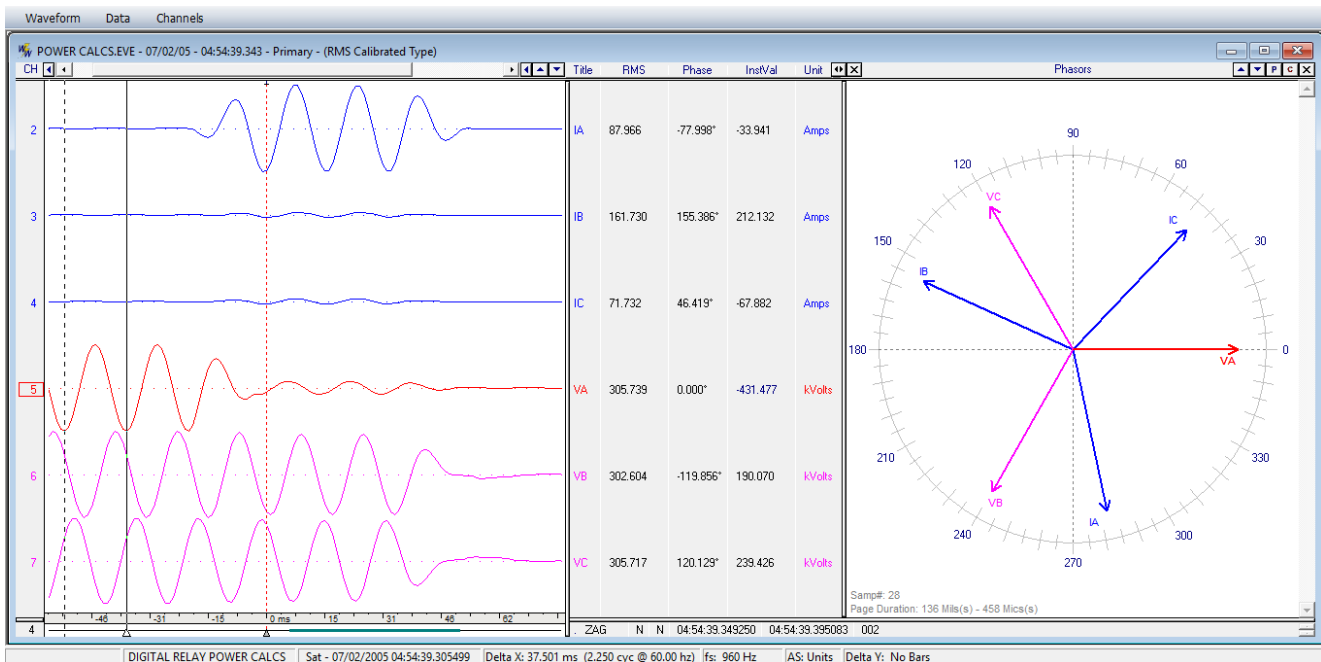
Step 2: Use the Software Analog Channels (SACs) to find the active and reactive power for each phase. Then, use two additional channels to total each as shown below.
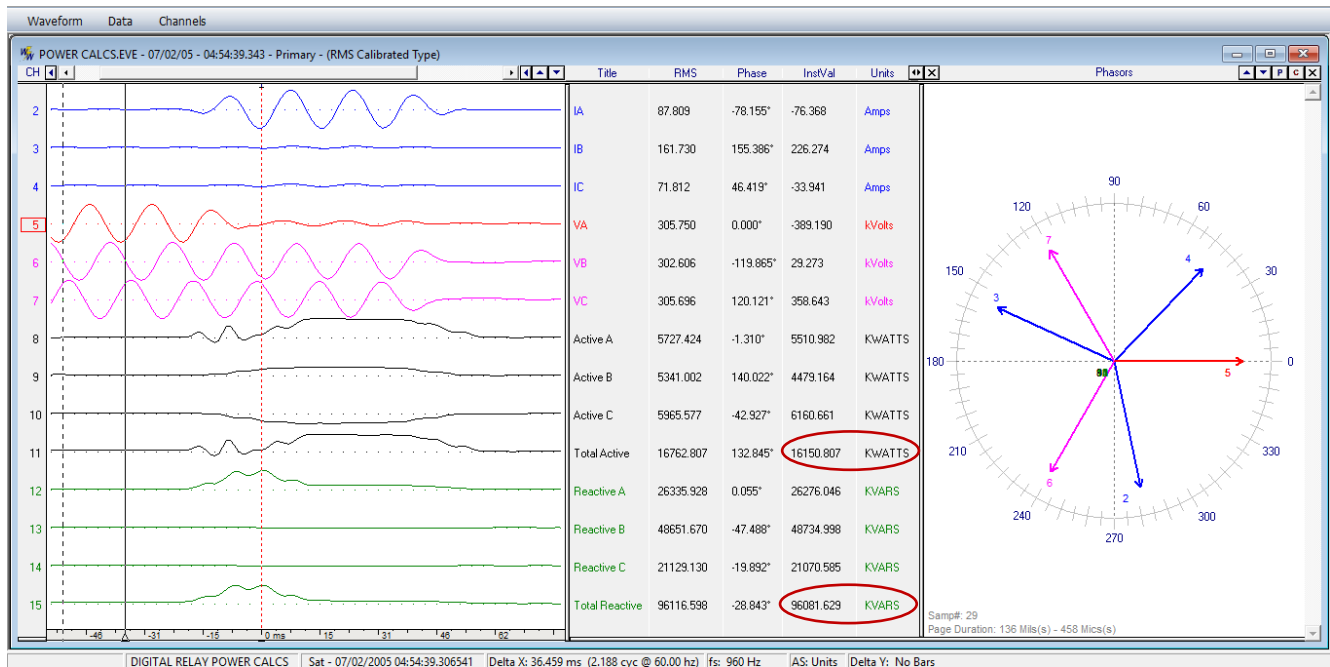
Step 3: To isolate channels, highlight them and press enter. Then, read the instantaneous values for total active and reactive power.