

App Note: Measuring Variable Speed Drives and Noisy Loads 2/1/1999

Variable speed drives and related devices are gaining popularity because they allow improved energy efficiency and more precise control over motors, blowers, etc. Unfortunately, these devices achieve their efficiency by rapidly (thousands of times per second) connecting and disconnecting the load. This rapid switching generates substantial noise and harmonics on the power lines. Measuring such noisy circuits can be difficult and requires extra care in the installation.

Older mechanical meters do not measure harmonic energy, so they may not accurately measure the power consumption when VSDs are in use. The WattNode does measure harmonic energy, but its solid-state measurement circuitry cannot make measurements at all if the noise level is too high. The following test can help determine if noise is interfering with the correct operation of the WattNode.

For delta models (WNA-3D-240 and WNA-3D-480), measure the DC voltage between the **ØA VAC** and each of the four CT wires—the easiest way to measure these is by probing the screw terminals with the multimeter probes. The voltage should be 2.5 VDC. If it is lower than 2.3 volts, then the WattNode is probably being overloaded with noise. You can also measure the AC voltage between these terminals. A result greater than 0.5 volts AC may also indicate excessive noise. For wye models, measure the DC and AC voltage between the **Neutral** and each of the six CT wires. The results should be the same as for the delta models.

If there is excessive noise, then the following steps should help reduce noise seen by the WattNode. First, cut the CT wires (the twisted white and black wires) as short as possible (ideally, less than 12 inches) and use the most direct possible wiring. Avoid running the CT wires parallel with other wires. Also avoid running the CT wires along a metal surface, such as the metal walls of a service panel or along conduit. If necessary, move the WattNode closer to the CTs (there is no harm in running the mains wires supplying the WattNode along metal or in conduit if needed to get the WattNode closer to the CTs).

It may also help to keep the WattNode and CTs some distance away from the variable speed (or variable frequency) drive and motor. If possible, put the WattNode near the circuit breaker panel, still keeping the CT wires as short as possible.



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