



Proper Product Selection

For Accurate Voltage Measurement



Voltage Transformer



Control Power Transformer

ISSUE

There have been instances where voltage measurements have been obtained using control power transformers instead of voltage transformers. Although both voltage transformers and control power transformers reduce voltage, voltage transformers with their high degree of accuracy are better suited for applications where metering accuracy is a concern.

APPLICATION

For *precise* metering of switchboards, switchgear, load management, transformers, and motor control centers, each piece of metering equipment should be measured within $\pm 1\%$ accuracy range or better. The industry requires this precision for each piece because the overall metering accuracy depends on the accuracies of each element. By restricting the metering error of instrument transformers, meters, and each associated piece of equipment, the overall reading is held to an accurate, reliable, and repeatable performance.

PRODUCT DESCRIPTION

Voltage transformers (VTs) reduce voltage in a known and accurate proportion to provide usable, standard secondary voltage levels that can be taken directly into transformer-rated meters. Voltage transformers have been designed and produced in accordance with ANSI C57.13 rated accuracies (0.3%, 0.6%, or 1.2%) and burden levels to provide extremely accurate signal levels for both ratio and phase-angle. Ratio and phase-angle information is used in metering to calculate how much true power is being used.

On the other hand, control power transformers (CPTs) are small power transformers. Their purpose is to reduce voltage to supply a small amount of power at a standard 120 Volts. The secondary voltage is designed to "regulation" standards in accordance with NEMA ST-1 guideline for power requirements. This type of transformer can be $\pm 5\%$ accuracy at the rated volt amperes (VA) and can have up to $+10\%$ error at zero-to-low VA for most smaller control power transformers (300 VA or lower). Note that this rating is significantly higher than voltage transformers. While phase angle error on control transformers is not normally defined, it will most likely be measured in degrees, whereas voltage transformers are measured in minutes, which is a fraction of a degree, and therefore, more precise.

TYPICAL PRODUCT ACCURACY EVALUATION

Transformer Type	Control Power Transformer	Square D Model 460R VT (Voltage Transformer)
Ratio	480:120	480:120
Ratio Error	$\pm 5.0\%$ @ Power VA	$\pm 0.6\%$ @ 12.5 VA
Phase Angle Error	>2 Degrees	± 31 Minutes ($\pm 1/2$ Degree)

When comparing performance of a typical control power transformer against that of a voltage transformer as in the table above, it is clearly demonstrated that accuracy of performance is why a voltage transformer is selected when taking voltage measurements.

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