

## Using Low Voltage Potential Transformers in Metering Applications

Most metering applications rely on an instrument transformer for current and voltage measurements – for this article, we'll focus specifically on Low Voltage Potential Transformers.

Potential Transformers (PTs), also known as voltage transformers (VTs), are used to convert low primary voltages to the standard 120Vac that is used as the input voltage signal for most metering devices.

These metering devices include digital voltmeters like the model DL-40PSF-DR-PS1-IA01, analog switchboard meters like the HLS110 that provide indication of the primary system voltage, and multifunction meters that measure kilowatts and kilowatt-hours.

Flex-Core offers different models of potential transformers based on your specific application requirements. When selecting the correct potential transformer, consider the following:

1. Is my metering application indoor or outdoor?
2. What is the primary system voltage?
3. What frequency is required – 50Hz or 60Hz?
4. Do you know your required accuracy class – example 0.3WXM, 50VA CL0.5?
5. What type of connection do I need – single phase, 3P3W, 3P4W, open delta or wye-wye?
6. Is thermal rating a concern?
7. Does your application need to meet certain standards such as ANSI/IEEE or IEC?
8. Other – do you need primary and secondary fuses, fuse clips only, etc.?

Low voltage potential transformers typically have maximum voltage of 600V and depending on the system voltages, these could have primary voltage ranges of 120V up to 600V.

Note – Flex-Core can custom build potential transformers that could be higher than 600V (eg. 690V primary) but these custom build potential transformers are non-UL.

### Low Voltage Potential Transformers for Single-Phase Metering Applications:

- The [model 460](#) is a single-phase potential transformer with an accuracy of 0.6W, 1.2X and a thermal rating of 150VA. The model 460 is designed for line-to-line operation and can also be operated line-to-neutral at reduced voltage. For three-phase applications, two of these units are connected in open-delta (3P3W) and three units are required for wye-wye connections (3P4W).
- The [model 468](#) has the same features as the model 460 except the thermal rating is only 75VA with a +/-0.6% accuracy of up to 7.5VA burden and +/-1.5% at 20VA. The models 460 and 468 should be able to handle most typical metering applications, particularly for voltage indications and power quality measurements. The model 460 and 468 are also used as isolation transformers (120:120V ratio) when the situation requires no direct connection to the primary voltages. Fusing is recommended to protect the potential transformers. Flex-Core can supply separate fuse blocks with fuses like the model KLK and BMM603 which are in stock.
- The [model 456](#) is a single-phase potential transformer with a revenue grade metering accuracy of 0.3WXM and 0.6Y and a thermal rating of 500VA at 30°C ambient. Aside from metering applications, the model 456 potential transformer can be used in applications where utility companies require their customers to provide low voltage instrument transformers for tariff metering. The model 456 is available as unfused, fused primary and with both primary and secondary fusing.

## Low Voltage Potential Transformers for Three-Phase Metering Applications:

- The [model 2VT-469](#) is a dual potential transformer assembly in one case with all terminals accessible for open delta connections. The 2VT469 has +/-1% accuracy for all burdens up to 5VA at 1.0 and 0.95PF and with a thermal rating of 40VA at 30°C ambient. Standard secondary voltage is 120Vac and with 60Hz rated frequency. This model is unfused, and we recommended to provide fusing for the transformer protection.
- The [model 2VT-460](#) offers the same features as model 2VT469 and is designed for open delta connections but with improved accuracy of 0.6W, 1.2X and 150VA thermal rating for each phase at 30°C ambient. This is available as an unfused or fused unit.
- The [model 3VTL-460](#) has three transformers in one case which can be used for line-to-line applications or line-to-neutral applications. Each phase has 150VA thermal rating at 30°C ambient and with an accuracy of 0.6W, 1.2X at 60Hz. The unit is unfused, but all the terminals are accessible.
- The [model 3VTN-460](#) accommodates three transformers but is designed for line-to-neutral connections. The secondary voltage is 120Vac L-N and again like the model 3VTL, each phase has 150VA thermal rating of 30°C ambient and with an accuracy of 0.6W, 1.2X at 60Hz.

These low voltage potential transformers (468, 460, 2VT469, 2VT460, 3VTL and 3VTN) are generally housed in low voltage switchgears, switchboards or motor control centers and provide the necessary voltage signals to the metering device that displays the primary system voltage value for monitoring the condition of the overall electrical system. These models are UL recognized and have CSA approval. All are intended for indoor applications.

Flex-Core maintains adequate levels of stock inventories for all these PTs for immediate shipment to customers.

For outdoor applications, non-standard voltage ratios or IEC rated potential transformers, Flex-Core can provide you with a build-to-order solution that meets your specific application requirements.