

## Available Solutions:

### 1. **Multi Secondary Voltage Transformer MSVT – common solution**

This is a transformer with one Primary and Multiple Secondary windings. The device is dedicated for testing single-phase meters. Each secondary winding is wired separately to individual measuring positions on the test bench.

Generally MSVT has no absolute accuracy specification. The manufacturer specifies the relative accuracy as the maximum difference of Voltage signal between secondary windings. According to manufacturers data this accuracy can be maintained below 0.1 or 0.2% supposing equal load impedance. However, nothing is said about the amplitude and phase errors between Primary and Secondary and even between Secondary windings loaded with real meters. As the individual winding output voltage depends on the effective impedance of the load [Meter under test], the natural variation of meter impedances can create big errors especially with capacitive meters. Most single phase meters are equipped with power sources acting as heavy capacitive load. We assume that impedance of all meters under test is equal. But in reality it varies even for the same type of Meter because of high tolerance specification of capacitors used in Power Supply of the meter. Hence, calibration certificate issued for equal resistive loads is not applicable for static meters.

Further, the overall accuracy of the test bench will be limited to the accuracy of the part which has the least accuracy, i.e. MSVT. Therefore, the user pays heavily for a test bench of accuracy 0.05 or even 0.02 but in reality he can test meters with accuracy of 0.2 or even worse if there is no applicable certification MSVT.

Additional error source of the MSVT is the leakage current from primary to secondary circuits due to capacitance between windings. This leakage current is added to the working current and thus can affect the measurement accuracy especially at low current tests. The MSVT manufacturers generally give no guaranteed limits for this error source.

### 2. **Distributed Multi Secondary Voltage Transformer D-MSVT™**

D-MSVT devices are a consistent set of individual accurate isolation transformers dedicated for testing single-phase meters and located directly at measured meter positions. The device is specified for both transfer accuracy from primary side to the secondary winding, relative accuracy between secondary windings and residual current due to inter-winding capacity. The specification is valid for specified load range. These devices come with calibration certificate from accredited laboratory. The devices are additionally equipped with voltage doubling and voltage halving function which can be used without loss in accuracy specification. This feature can be used for 115V meters in 230V test system or vice versa. D-MSVT system can be easily implemented into any existing test bench without need of costly rewiring.

### 3. **Precision Electronically Compensated Voltage Transformer CMR-U™**

CMR-U device is an electronically controlled isolation voltage transformer dedicated for testing single-phase meters. The device is located directly at measured meter position. It is specified for absolute transfer accuracy which means that accuracy limit for both phase and amplitude of the secondary voltage is specified irrespective of the load. These devices come with calibration certificate from accredited laboratory. Advantage of this device is that even different types of meters can be tested simultaneously without loss of accuracy. Further, the overall accuracy of the test bench can be maintained selecting the appropriate voltage transformer accuracy class. CMR-U devices can be easily implemented into any existing test bench without need of costly rewiring.

### 4. **Precision Electronically Compensated Current Transformer CMR-I™**

CMR-I device is an electronically controlled isolation current transformer dedicated for testing three-phase or single-phase meters with multiple current measuring circuits. The device is located directly at measured meter position. It is specified for absolute transfer accuracy which means that accuracy limit for both phase and amplitude of the secondary current is specified irrespective of the load. These devices come with calibration certificate from accredited laboratory. Advantage of this device is that even different types of meters can be tested simultaneously without loss of accuracy. Further, the overall accuracy (0.05%, 0.02% or 0.01%) of the test bench can be maintained selecting the appropriate current transformer accuracy class. CMR-I devices with through-hole wiring can be easily implemented into any existing test bench.

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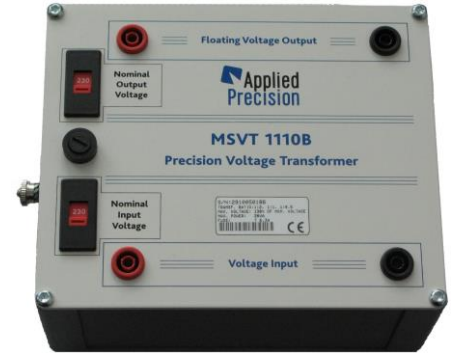
## Solutions of Applied Precision Ltd.:



Precision Electronically Compensated Current Transformer **CMR-I**™



Precision Electronically Compensated Voltage Transformer **CMR-U**™



Distributed Multi Secondary Voltage Transformer **D-MSVT**™

## ⇒ Technical Specifications

	Precision Electronically Compensated Current Transformer <b>CMR-I</b> ™	Precision Electronically Compensated Voltage Transformer <b>CMR-U</b> ™	Distributed Multi Secondary Voltage Transformer <b>D-MSVT</b> ™
Number of phases	Single-phase, two-phase or three-phase	Single-phase	Single-phase
Working Primary Current Range	1 mA ... 240 A	-	-
Working Voltage Range	-	150 V .. 300 V (50 V .. 150V option)	High range: 230 V ± 20% Low range: 115 V ± 20%
Frequency Range	45 ... 65 Hz	45 ... 65 Hz	45 ... 65 Hz
Output / Input Voltage Ratio	1:1	1:1	1:1, 1:2, 1:0.5
Max. Output Voltage	0.42 V	300 V	300 V
Max. Output Current	-	100 mA	50 mA @ 230 V range 100 mA @ 115 V range
Max. Amplitude Error	0.01 / 0.02 / 0.05 % *	0.05 % / 0.02 % **	0.2 % @ 5 VA
Max. Phase Error	0.005 / 0.01 / 0.03 ° *	0.03 ° / 0.012 ° **	0.12 ° @ 5 VA
Max. Amplitude Difference	-	-	0.05 % @ 2VA difference
Max. Phase Difference	-	-	0.03 ° @ 2VA difference
Max. Input / Output Capacitance	-	Compensated	700 pF
Protection	Overload, Open Circuit	Overload, Short Circuit, Misconnection	Short Circuit
Power Supply	From ext. power supply PSCI 1220A	From input signal (no extra supply needed)	None (Passive Device)
Communication	RS-422	-	-
Size (W x D x H)	160 x 125 x 250 mm	180 x 150 x 60 mm	200 x 145 x 80 mm
Weight (approx.)	5 kg (single phase) 7 kg (two-phase) 9 kg (three-phase)	2.7 kg	5 kg

\* Max. Errors specified for whole Working Primary Current Range

\*\* Max. Errors specified for whole Working Voltage Range