

Single-Phase Transformer Test Systems

Testing Applications

Ensure that a transformer's performance is met for life

- verifying a manufacturer's test and design data prior to installation
- after repair or upgrade
- when a major disruptive event occurs, such as a lightning strike
- for preventive/predictive maintenance



Model TTS10M

Models Available

- TTS5M
- TTS10M
- TTS20-1
- TTS30-1
- TTS50-1

- **Verified**, proven design
- **Minimal** set-up time
- **Quick, accurate** and **reliable** testing



Model TTS30-1

Safety and Design Features

- Circuit breaker protection
- High voltage On/Off pushbuttons with indicator
- External interlock provision
- Slow- and fast-acting overload protection
- Zero Start interlock
- Output overload indicator with reset switch
- Multi-range metering
- Temperature meter with 15 foot (4.5 meter) thermocouple
- Four-wire measurement system for accurate readings
- Surge protection devices on all meters and relays
- Recalibration provisions for all meters
- Foot switch for operator safety
- Flashing red warning lamp
- Two copies of operation/maintenance manual

Unique to Models TTS5M & TTS10M

- Manual control of output voltage
- Hold function for all meters
- Three constant kVA taps
- Casters for ease of mobility
- Cable storage hooks

Unique to Models TTS20-1, TTS30-1, TTS50-1

- The Human Machine Interface (HMI) allows the programming of automation features of the test set. All output meters are displayed on the LCD screen. Data acquisition and report generation of the test results are performed via computer and WIN TTS testing software with all required interface cables included. The HMI eliminates a large number of relays and meter wiring which increases reliability. All calibration functions are performed and component self-checks are achieved which aid a service technician in locating malfunctioning components in the event of a failure.
- Zero Start interlock with auto return of regulator to zero position
- Raise and Lower pushbuttons with Off Zero indicator
- Motorized control of output voltage with adjustable rate of rise
- Control power key switch with indicator
- EMERGENCY OFF mushroom switch
- Motorized tap selector with indicators
- Auto-ranging wattmeter and voltmeter with direct readout
- 15 foot (4.5 meter) output leads with boots and clips (separate power and measurement leads). Jacks for output leads are recessed for operator safety; leads are removable for operator convenience
- Fork truck and overhead lifting provisions.

Phenix Technologies' Single-phase Transformer Test Systems are designed to provide voltages and currents to test single-phase distribution transformers.

The size of transformers which can be tested will vary with impedance. Test systems equipped with optional high voltage taps will allow testing of transformers with higher impedances and/or higher secondary voltages.

The precision metering system complies with DOE efficiency and international transformer standards.

Testing will ensure that a transformer meets purchase specifications and will perform adequately after installation.

Perform the following tests in accordance with ANSI / IEEE C57 and IEC60076 standards:

- Excitation Current Measurement
- Excitation Loss (No-Load or Core Loss)
- Impedance Voltage Measurement
- Copper Loss (Load Loss)
- Temperature Measurement
- Temperature Measurement (Heat Run) (via models TTS20-1, TTS30-1, TTS50-1 only)

Additional testing can be performed when the following options are added:

- Applied Potential Test with the addition of an AC Hipot
- Induced Potential Test with the addition of a Motor Generator Set
- Turns Ratio Test with the addition of a Transformer Turns Ratio Test Set
- Winding Resistance Measurement with the addition of a Winding Resistance Meter

Environmental Conditions

- 10-40°C, indoor/outdoor in fair weather
- Humidity <95% non-condensing
- Altitude <3300 ft (1000 meters)

	MODEL	TTS5M			TTS10M		
APPROX. MAXIMUM TEST CAPABILITY	Impedance	2%	4%	6%	2%	4%	6%
	Load Loss	375 kVA	188 kVA	125 kVA	750 kVA	375 kVA	250 kVA
	Primary Voltage of Transformer	30 kV	15 kV	10 kV	30 kV	15 kV	10 kV
INPUT	Voltage/Current	208/230 VAC, 40 A, single phase			208/230 VAC, 80 A, single phase		
	Frequency	50 or 60 Hz (one must be specified)			50 or 60 Hz (one must be specified)		
		(Other input voltages are available; consult factory)					
OUTPUT	TAP	Voltage	Current		Voltage	Current	
			Continuous	5 min ON/15 min OFF		Continuous	5 min ON/15 min OFF
	1	0-150 VAC	33 AAC	50 AAC	0-150 VAC	67 AAC	100 AAC
	2	0-300 VAC	16.5 AAC	25 AAC	0-300 VAC	33.5 AAC	50 AAC
3	0-600 VAC	8.3 AAC	12.5 AAC	0-600 VAC	16.7 AAC	25 AAC	

METERING	Metering/Accuracy	4 1/2 digit with LED display, $\pm 0.5\%$ of reading +0.2% of range
	Voltmeter	0-150/300/600 VAC, selectable True RMS or Average
	Currentmeter	0-1.999/19.99/199.9 A, True RMS
	Wattmeter	Auto Ranging
	Temperature	Range: 0-100° C, Accuracy: $\pm 2^\circ$ C (20-80° C)

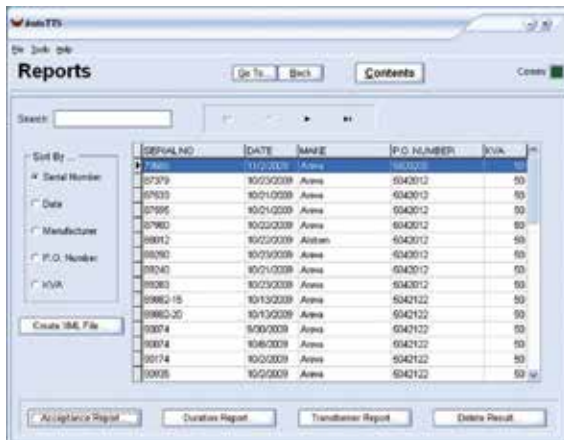
	MODEL	TTS5M	TTS10M
APPROXIMATE DIMENSIONS & WEIGHTS	L	32" (813 mm)	
	W	29" (737 mm)	
	H	52" (1321 mm)	
	Wt	455 lbs (206 kgs)	510 lbs (231 kgs)

	MODEL	TTS20-1			TTS30-1			TTS50-1		
APPROX. MAXIMUM TEST CAPABILITY	Impedance	2%	4%	6%	2%	4%	6%	2%	4%	6%
	Load Loss	1000 kVA	500 kVA	333 kVA	1500 kVA	750 kVA	500 kVA	2500 kVA	1250 kVA	833 kVA
	Heat Run	500 kVA	250 kVA	167 kVA	750 kVA	375 kVA	250 kVA	1250 kVA	625 kVA	417 kVA
	Primary Voltage of Transformer	120 kV	60 kV	40 kV	120 kV	60 kV	40 kV	120 kV	60 kV	40 kV
INPUT	Voltage/Current	208-600 VAC, 22 kVA (voltage must be specified)			208-600 VAC, 33 kVA (voltage must be specified)			208-600 VAC, 55 kVA (voltage must be specified)		
	Frequency	50 or 60 Hz (one must be specified)			50 or 60 Hz (one must be specified)			50 or 60 Hz (one must be specified)		
OUTPUT	TAP	Voltage	Current		Voltage	Current		Voltage	Current	
			Continuous	5 min ON/15 min OFF		Continuous	5 min ON/15 min OFF		Continuous	5 min ON/15 min OFF
	1	0-240 VAC	42 AAC	83 AAC	0-240 VAC	63 AAC	125 AAC	0-240 VAC	104 AAC	208 AAC
	2	0-300 VAC	33 AAC	67 AAC	0-300 VAC	50 AAC	100 AAC	0-300 VAC	83 AAC	167 AAC
	3	0-480 VAC	21 AAC	42 AAC	0-480 VAC	31 AAC	63 AAC	0-480 VAC	52 AAC	104 AAC
	4	0-600 VAC	17 AAC	33 AAC	0-600 VAC	25 AAC	50 AAC	0-600 VAC	42 AAC	83 AAC
	5	0-1000 VAC	10 AAC	20 AAC	0-1000 VAC	15 AAC	30 AAC	0-1000 VAC	25 AAC	50 AAC
	6	0-1600 VAC	6.3 AAC	12.5 AAC	0-1600 VAC	9.4 AAC	19 AAC	0-1600 VAC	16 AAC	32 AAC
7	0-2400 VAC	4.2 AAC	8.3 AAC	0-2400 VAC	6.3 AAC	12.5 AAC	0-2400 VAC	10.4 AAC	21 AAC	

METERING	Voltmeter	4 digit, Accuracy: $\pm 0.5\%$ of reading +0.2% of range Multi-range, Auto-ranging from 24-1600 VAC, selectable True RMS or Average
	Currentmeter	4 digit, Accuracy: $\pm 0.5\%$ of reading +0.2% of range 0-1.000/10.00/100.0 Amps, True RMS
	Wattmeter	4 digit, Accuracy: 1.0 pF: $\pm 0.5\%$ of F.S. \pm LSD, 0.3 pF: $\pm 1.5\%$ of F.S. \pm LSD, 0.1 pF: $\pm 3.0\%$ of F.S. \pm LSD Auto-ranging
	Temperature	4 digit, Accuracy $\pm 3^\circ$ C 0-199.9° C

	MODEL	TTS20-1 / TTS30-1 / TTS50-1
APPROXIMATE DIMENSIONS & WEIGHTS	L	70" (1778 mm)
	W	45" (1143 mm)
	H	76" (1930 mm)
	Wt	1500-1900 LBS (680-862 kgs)

Testing Software



	MODEL	TTS5M & TTS10M
CABLES INCLUDED	Input Power	15' (4.5 m)
	Power Interconnect	10' (3 m)
	Meter Interconnect	10' (3 m)
	Ground	15' (4.5 m)
	Thermocouple	15' (4.5 m)

	MODEL	TTS20-1/TTS30-1/TTS50-1
CABLES INCLUDED	Output Leads	15' (4.5 m)

Options

- **Applied Potential Testing Capability via AC Hipot, cylinder-type**
- **Induced Potential Testing Capability via Motor Generator Set** includes ON/OFF controls and frequency meter built into the control panel
- **Transformer Turns Ratio Test Set**, Type PATTR-03D
- **Transformer Winding Resistance Meter**, Type WRM-10N
- **Laptop Computer**
- **External Printer**

OPTIONS Available for Models TTS5M and TTS10M

- **Computer Interface and Testing Software** Includes RS232 output for interfacing all metering of the test system to a computer. The software performs all loss calculations (including correction for temperature and sine wave basis), records all test data, and generates reports.

OPTIONS Available for Models TTS20-1, TTS30-1, TTS50-1

- **Variable Frequency / Electronic Power Supply**
 - Replaces variable transformer and motor generator
 - Adds 50 Hz testing capability (selectable 50/60/400 Hz)
 - Less than 2% Total Harmonic Distortion (THD)
 - Main input requirement changes to 3 phase
- **Remote Control Console** with writing desk and 25 foot (7.6 m) interconnect cables (longer cables are available upon request)



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