

**OPTIONAL ACCESSORIES FOR TESTING LARGE GENERATORS AND MOTORS USING MODEL ACTS-12K**

Range Extension Transformer to extend the Bridge Capacitance range upto 2.6µF. The 10kV Capacitance value that can be measured will depend on the number of Compensating Reactors used.  
Compensating reactors to boost the power supply rating which enables measuring a Capacitance of upto 1.1µF at 10kV, 50 Hz OR 1µF at 10kV, 60 Hz.



**ACTS - 12K BRIDGE FEATURES**

**Operation with External Supply and Reference Capacitor.**  
The bridge portion of the ACTS - 12K test set can be used independently from its HV power supply source, with minor modifications to the bridge internal circuitry. The bridge alone can be used with an external HV power supply and external HV reference capacitor to make C & DF measurements in the UST configuration. If the external power source is properly shielded and guarded, the bridge can also be used in the GST configuration. The operation with external supply and capacitor allows for changing the operating voltage and capacitance range of the instrument. Thus when :

- Using a 100 pF capacitor, the range becomes 0.13 µF.
- Using a 50 pF capacitor, the range becomes 0.065 µF.

With minor internal modifications the bridge can be used successfully at voltages upto 200 kV with reference capacitors of 50 or 100 pF of 200 kV rating.

The Range Extension Transformer extends the Bridge Capacitance range upto 2.6µF. When the Range Extension Transformer is used along with the ACTS - 12K Bridge, External Standard Capacitor & External Power Supply, the Capacitance value that can be measured at a specified voltage will depend on the value of Standard Capacitor & the KVA rating of the Power Supply.

**OTHER PRODUCTS**

- Manual & Automatic Transformer Ratio Meters.
- Manual & Automatic Transformer Winding Resistance & On Load Tap Changer Test Sets.
- Automatic CT/VT Test Sets & System.
- Semi-Automatic HV Capacitance & Tan Delta Test Sets.
- Manual & Automatic Tan Delta & Resistivity Test sets for Transformer Oil.
- Manual & Automatic Portable LV Capacitance & Tan Delta Test Sets.
- Digital Micro Ohm Meters with built in 100A. source
- Relaying Current Transformer Analyser.



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(SPECIFICATIONS OF TEST SETS & SOFTWARE FEATURES SUBJECT TO CHANGE WITHOUT NOTICE)

Reptame Equipment Inc.  
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**Automatic Capacitance & Tan Delta Test Sets**



ACTS-12K

**FEATURES**

- Fully Automatic Microprocessor Controlled Capacitance & Tan Delta Test Sets.
- Continuously variable test voltages upto 12kV (5kV on Model ACTS-5k)
- Provides direct digital display of Voltage, Current, Capacitance, Power Factor / Dissipation Factor, Power, Frequency, Inductance, Interference Current, Excitation Current, Equivalent 2.5kV/10kV readings & cable connection details to specimen.
- Automatic Interference Suppression & Measurement Circuitry - Proven performance in 400kV / 545kV & 760 kV Substations.
- The test set can be operated independently & directly from front panel without the need for a dedicated Laptop PC
- Measurements using any one or all seven Industry Standard Configurations -UST (3 positions), GST (1 position) & GST-g (3 positions)
- Opto isolated Printer & Computer Interfaces
- Data storage facility



ACTS-5K

Eltel Automatic Capacitance & Tan Delta test sets Model ACTS-12K / ACTS-5K are instruments designed to conduct Power Factor tests on electrical insulation. The test sets are capable of automatically measuring the insulation Power Factor of multi-terminal equipment at voltages ranging from less than 1kV upto 12kV. (upto 5kV on ACTS - 5K). Being equipped with two measuring leads, the test sets can measure all the quantities associated with multi-terminal electrical power equipment.

In addition to measuring the Capacitance and Power Factor of insulation, the test sets can measure the excitation current of transformers and other equipments.

### PRINCIPLE

The Eitel Automatic Capacitance and Tan Delta Test Sets operate on the transformer ratio arm bridge principle. The current from the device under test is compared to the current of an internal reference capacitor. The residual of this comparison is measured and resolved into in-phase (watt loss) and quadrature current components. The test voltage and total specimen current are also measured. From these measured quantities, Power Factor and Capacitance are calculated and displayed along with the test voltage, current and power loss.

### APPLICATION

Model ACTS - 12K / ACTS - 5K Automatic Capacitance and Tan Delta Test Sets can be used for shop or field testing of electrical insulation at voltages upto 12kV, (5kV on ACTS - 5K) where the need for portability and simple operation is required. Examples of equipment that may be tested include: generators, power, distribution, instrument and generator transformers, oil and air blast circuit breakers, cables, pot heads, bushings, CTs, CVTs, motor coils, insulating oils (with accessories) etc.,

### INTERFERENCE SUPPRESSION

The Test set has a fully Automatic Interference measurement and suppression circuitry. When activated by the operator, the circuitry automatically measures and suppresses the interference, which enables accurate measurements in HV Switchyards where interference levels are normally high. Interference Suppression in the Model ACTS-12K is derived from a Phase locked Oscillator that provides separate Capacitance & Tan Delta adjustments. This Oscillator can be phase locked to the Line Frequency.

## SPECIFICATIONS

### CAPACITANCE

Range	: 0 to 0.26 $\mu$ F (Bridge range). (ACTS-12K with the 12kV/200mA Power Supply we can test a Max. Capacitance of upto 0.06 $\mu$ F @ 10kV, 50Hz or 0.05 $\mu$ F @10kV, 60 Hz). (ACTS-5K with the 5kV / 200mA Power Supply we can test a Max. Capacitance of upto 0.12 $\mu$ F @ 5kV, 50Hz or 0.1 $\mu$ F @ 5kV, 60 Hz).
Accuracy	: $\pm$ 0.2% of reading $\pm$ 1 pF (UST). $\pm$ 0.2% of reading $\pm$ 10 pF (GST).
Resolution	: 4 digits

### DISSIPATION FACTOR (TAN DELTA)

DF Range	: 0 to $\pm$ infinity
Accuracy	: $\pm$ 1% of reading $\pm$ 0.05%
Readout	: 5 digits
Highest Resolution	: 0.00001

### POWER

Range	: 0 to $\pm$ 2 kW
Accuracy	: $\pm$ 1% of reading
Readout	: 4 digits
Highest Resolution	: 1 micro watt

### INTERFERENCE CURRENT

Range	: 0 to 100 mA
Accuracy	: $\pm$ 1% of reading
Best Resolution	: 1 micro ampere

### EQUIVALENT READINGS

Provides printout for equivalent values at 2.5 or 10 kV readout as selected by operator

### POWER FACTOR

Range	: 0 to 100% (Positive or Negative) PF display in absolute value & in %. It will display (0 to 0.99999) with a 5 digits resolution
Accuracy	: $\pm$ 1% of reading $\pm$ 0.05%
Highest Resolution	: 0.00001

### INDUCTANCE

Range	: Infinity upto 40H (50Hz) & 27H (60Hz)
Accuracy	: $\pm$ 0.2% of reading
Resolution	: 0.01H

### VOLTAGE

Range	: 0-12000 V 0-5000V (ACTS-5K)
Accuracy	: $\pm$ 1% of reading, RMS responding
Resolution	: 1 volt

### CURRENT

Range	: 0 to 2000 mA
Accuracy	: $\pm$ 1% of reading
Highest Resolution	: 1 micro ampere

### FREQUENCY

Operating Range	: 45 to 65 Hz
Accuracy	: $\pm$ 0.02 Hz
Resolution	: 0.01 Hz

### DATA STORAGE FACILITY

Can store upto a maximum of 70 readings & the data is retained in memory even when the instrument is switched OFF.

### INDICATION

240 x 128 dot matrix LCD panel with back light.

### INTERFACE

RS232C serial interface to PC for full control.  
Centronix parallel port for printer interface.

### KEYBOARD

20 keys, membrane keyboard on front panel.

## STANDARD CAPACITOR

CAPACITANCE	: 200pF Air Capacitor with guard
ACCURACY :	
CAPACITANCE	: $\pm$ 0.5%
TAN DELTA	: $\pm$ 2 x 10 <sup>-4</sup>

### POWER OUTPUT

ACTS - 12K	
A) 0 - 12 kV Tap	0 - 12kV @ 100mA continuous 0 - 12kV @ 200mA intermittent
B) 0 - 2.4kV Tap	0 - 2.4kV@ 500mA continuous 0 - 2.4kV@ 1000mA intermittent
ACTS - 5K	
0 - 5 kV	0-5kV @ 100mA continuous 0-5kV @ 200mA intermittent

### POWER INPUT

ACTS - 12K	ACTS - 5K
230V $\pm$ 10%, 50 Hz, 1.2 kVA (2.4 kVA intermittent) OR 110V $\pm$ 10%, 60Hz, 1.2 kVA (2.4 kVA intermittent)	230V $\pm$ 10%, 50Hz, 500 VA (1000VA Intermittent) OR 110V $\pm$ 10%, 60Hz, 500 VA (1000VA Intermittent)

### APPLICABLE STANDARDS

ACTS-12K meets the EMI/EMC Test requirements as per IEC 61000-4-3 - Radiated Susceptibility Test  
IEC 61000-4-5 - High Energy Surge Immunity Test  
IEC 61000-4-11 - Voltage dips & Interruption tests

### MECHANICAL DATA

ACTS - 12K	ACTS - 5K
<b>Bridge</b> 515 x 510 x 178 mm (L x B x H) Weight : Approx. 24 Kgs (49 Kgs with carrying case)	<b>Bridge &amp; Power Supply in one unit</b> 515 x 510 x 310 mm (L x B x H) Weight : Approx. 52 Kgs. (90 Kgs with carrying case)
<b>Power Supply</b> 515 X 510 X 310 mm (L x B x H) Weight : Approx. 65 Kgs (90 Kgs with carrying case)	Dimensions : 510mmx520mmx315mm (LxHxB)
<b>Cable Box</b> : 600 x 400 x 340 mm (LxBxH) Weight : Approx. 23 Kgs.	
<b>Temperature Range</b> : -10 to 50 deg C <b>Humidity</b> : Ambient to 90%, RH	

### STANDARD ACCESSORIES

#### CABLES

- High voltage cable (12kV / 5kV) of 20m length double screened and equipped with clips and hooks.
- Two low voltage leads of screened cable of 20m length equipped with clips and hooks.
- Two grounding cables of 20 & 10m length equipped with clips.
- Foot switch used for safety of operator while handling high voltage; equipped with 5m length cable.
- One set of interconnecting cables.
- Mains connecting cable of 10m length.
- RS232 Cable for PC Interface - 2m
- Printer Cable for Printer - 2m
- Transport Cases - Bridge, Power Supply & Cables
- Operation Manual

### POWER SUPPLY RATING / MAX. CAPACITANCE MEASURING RANGES

EQUIPMENT	ACCESSORY	TEST VOLTAGE	MAX CAPACITANCE (50 Hz)	MAX CAPACITANCE (60Hz)
ACTS - 12K	-	10kV 2.4kV	0.06 $\mu$ F 0.26 $\mu$ F	0.05 $\mu$ F 0.2 $\mu$ F
ACTS - 12K	CTS-RE	10kV 2.4kV	0.06 $\mu$ F 1.2 $\mu$ F	0.05 $\mu$ F 1.0 $\mu$ F
ACTS - 12K	CTS-RE CTS-100 (1No. of 0.1 $\mu$ F) CTS-50 (1No. of 0.2 $\mu$ F)	10kV	0.36 $\mu$ F	0.3 $\mu$ F
ACTS - 12K	CTS-RE CTS-100 (1No. of 0.1 $\mu$ F) CTS-50 (5Nos. of 0.2 $\mu$ F)	10kV	1.1 $\mu$ F	1.0 $\mu$ F

### SAFETY FEATURES

- Zero start control and interlock for HV output.
- Double grounded connections needed to operate set with an open ground indicating lamp.
- All operator controls are at earth potential.
- External interlock must be manually closed for HV output.
- An interlock is provided to actuate safety barrier, warning light, etc.
- No energised terminals accessible from outside of modules.
- Protective Circuit Breaker and Transformer Thermal Sensor to guard against sustained overloading of the power supply.
- Short Circuit Protection.
- Indicating lamps for power supply & for HV 'ON'.
- Reset switch provided for disabling short-circuit and over voltage indicators.

### OPTIONAL ACCESSORIES

- 10kV Oil Test Cell-Measurements at ambient temperature only.
- Calibrator for Capacitance and Tan Delta - Provides One Capacitance & three Tan Delta values.
- Windows Analysis & Interface Software : This is a Windows based software. The software can be operated on any Windows platform.