



SIVA INSTRUMENTS

CAPACITANCE & TAN DELTA

MEASUREMENT SYSTEM

(Semi Automatic System)



Applications

Power Systems.
Power Cables

Testing of H.T. Transformers, Motors, Generators, Bushings.
H.T. & L.T. Power Capacitors

High Voltage Laboratories.

INTRODUCTION

Electrical properties of insulating systems change due to age and continuous electrical stress. By measuring electrical properties such as Capacitance and Tan δ regularly it is possible to ensure the operational reliability of H.V. insulating systems and to avoid costly breakdowns. This is particularly important for high voltage bushings, power transformers, generators, power capacitors, H.T. cables etc.

SIVA Capacitance and Tan δ test set comprises of Cand Tan δ Bridge Model MLS-11DM, High Voltage Power Supply Model HLS-4 with built in standard capacitor, and set of cables.

The compact design of the Bridge uses the principle of three winding differential transformer on a high permeability μ metal core. The Bridge is contained in a sturdy metallic housing with μ metal lining which shields it from external electromagnetic & electrostatic influences. Built in battery powered Null indicator makes the Bridge suitable for operation in workshop, factories, High Voltage sub-stations, Switch Yards etc.

The High Voltage Power Supply model HLS-4 is provided with built in SF₆ gas filled standard capacitor. It is suitable for both grounded as well as ungrounded objects.

Capacitance & Tan δ are measured directly, no further calculations are required.

C & TAN δ BRIDGE

MODEL : MLS-11DM



Technical Specifications :

Capacitance :

Range : 1 pF to 0.1 μ F in three ranges with $C_s=100$ pF

Resolution : C_x multiplying Factor Resolution

0.01	0.1 pF
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0.1	1 pF
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1	10 pF
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Accuracy : $\pm 1\%$ of reading \pm Range Resolution ± 1 pF

Tan δ

Range : 0.0001 to 2.0 in two ranges.

Tan δ Factor	Tan δ Range	Resolution
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20%	1×10^{-4} to 0.2	1×10^{-4}
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200%	1×10^{-3} to 2.0	1×10^{-3}
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Accuracy : $\pm 1\%$ of reading $\pm 5 \times 10^{-4}$ for
MLS-11DM.

Null Detector

Built in battery operated electronic Null Detector. This type of Null Detector is most suitable for balancing of the Bridge. It gives high sensitivity and accuracy for most of the applications and it is very user friendly.

Phase sensitivity Null Detector can be given in place of electronic Null Detector on request.

For higher sensitivity and accuracy, oscillographic null detector model MK-1 for critical operation is also available.

Interface Suppression

The C & Tan δ Bridge has been specially shielded with u, metal sheets to avoid the effect of external interferences. This makes the measurement accurate in both indoor as well as out door applications particularly in Switch yards.

Phase reversal switch provided in the H.V. Power Supply effectively cancels interference/pick up by the object under test in energised environment.

For situation where the induction is excessive, and cannot be cancelled by phase reversal switch a separate three level interference suppression unit can also be given with separate C & Tan δ adjustments.

Protection :

The Bridge is provided with built in high voltage protection devices which protect the Bridge and operator against failure of test object or standard capacitor.

Size : L=345, B=370, H=190 mm

Weight : < 15 Kg.



Technical Specifications :

Test Voltage : 0 to 4 KV , 100mA
 0-2.5KV , 500mA
 continuous
 1Amp Short Term.

(The H.V. power supply with higher power capacity upto 15 KVA or with a tap at lower voltage for higher current is also available).

Switch for three different types measurement

- 1) **UST** - Ungrounded Specimen Test.
 This mode is used when the object under test is not grounded. This test provides most accurate results.
- 2) **GST** - Grounded Specimen Test.
 This mode is used when the object under test is permanently grounded. This test is used more often in outdoor installations, power systems, etc.
- 3) **GSTg** - Grounded Specimen Test with guard.
 This mode is used for measuring stray capacitances and separating from basic measurement in GST mode

Indication : Two 3½ digit digital panel meters one for voltage indication with 19.99 KV full scale and other for current indication.

Safety Features :

- ◆ Zero start control
- ◆ Open ground indication lamp with double grounded connection External interlock
- ◆ HT cut off on overload
- ◆ HT ON & Supply ON indication
- ◆ All operating controls at earth potential.
- ◆ Necessary terminals & sockets
- ◆ For connection to MLS-11D M

Power Required : 230 VAC ±10%, 50 Hz
Size : 510 x 350 x 415 mm ± 10mm
Standard Capacitor : Standard Capacitor is compressed SF₆ gas filled type and is built into HV power supply.
Capacitance : 100 pF ±5%, actual value is indicated on capacitor.
Tan Dielectric : Less than 0.00001
Test Voltage : SF₆
 : upto 12 KV RMS.
Max. Voltage (1 minute) : 12 KV RMS.



COMPRESSED GAS STANDARD CAPACITOR

Compressed Gas Standard Capacitor is a fixed capacitor used as capacitance standard in Bridge circuit for precision measurement of Capacitance and Tan d of high voltage test objects.

The main feature of these capacitors is negligible dissipation factor (Tan d)

The electrodes are made of polished metal and enclosed in a suitable housing for protection against dust and moisture. The compressed gas capacitor is filled with Sulphur Hexafluoride (SF₆) under moderate pressure.

MODEL	CS/100/12	CS/100/20	CS/1000/20
Capacitance	100pf±5%	100 pf±5%	1000pf±1%
Operating Voltage	up to 12 KV rms	up to 20 KV rms	up to 12 KV rms
Max. Voltage (1Min.)	14 KV rms	25 KV rms	14 KV rms
Accuracy of Capacitance	0.1%	0.1%	0.05%
Tan δ	<1 x 10 ⁻⁵	<1 x 10 ⁻⁵	<1 x 10 ⁻⁵
Operating Frequency	50Hz + 10%	50Hz+10%	50Hz+10%
Temp. coeff	<100 ppm	<100 ppm	<100 ppm
Dielectric	SF ₆	SF ₆	SF ₆
Max. Height	370 mm	450 mm	480 mm
MaxDiameter	170 mm	250 mm	340 mm

*For Power Industries
Sivananda Electronics also offers :
High Voltage Insulation Testers upto
5kv (Solid State), Compact C and Tan
d Bridge (30V/80 Hz)
Oil Test System, Resonant Power
Supply, Partial Discharge Equipment
and Surge Testers, Transformer winding
resistance meters and Transformer
Ratio Meters .*

*Sivananda Electronics reserves the right to update its system. Hence,
information in the brochure is likely to change without notice.*



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