

9910A



AC HIGH VOLTAGE CAPACITANCE AND INDUCTANCE BRIDGE

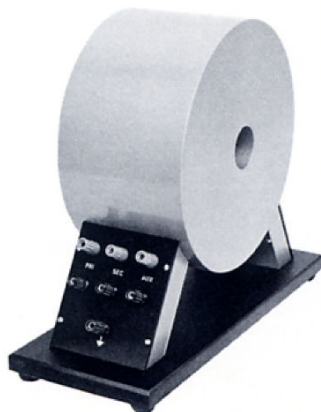
Still providing the Most Accurate Capacitance & Inductance Measurements!



9910A MODEL FEATURES

- ◆ Better than 15 ppm accuracy, permanent
- ◆ Direct reading, six-digit measurements of capacitance from 100 pf to 1000 μ F
- ◆ Dissipation factor up to 11.1 percent
- ◆ Working Voltage to 50 kV with 9911
- ◆ Safe to operate, even into megavolt region. Bridge components remain at ground potential
- ◆ Ideal for measuring low-loss, high voltage power cables, insulators, transformers, P.F. correction capacitors and reactors

View of
Optional
9911



GUILDLINE INSTRUMENTS MODEL 9910A HIGH VOLTAGE Capacitance Bridge is an instrument employing the AC Current Comparator principle.

The Current Comparator principle may be applied to the measurement of ratio and dissipation factors of high voltage capacitors in a similar manner to the classical Schering Bridge but with greatly improved accuracy and resolution.

This makes the 9910A a unique and versatile instrument for a wide range of applications including cable testing, corona loss measurements, insulator and dielectric testing, inductance measurements, potential transformer error measurements, shunt reactor loss measurements and power transformer testing.

This measurement standard has a direct reading capacitance ratio of 0 to 1.111,110 in steps of 0.000,001 (1 ppm). The 9910A has a direct reading dissipation range of -0.110999 to +0.110999 in steps of 0.000,001 (1 ppm).

Optional 9911 Range Extender available for special use in shunt reactor loss measurement and power transformer testing applications!

Bridge resolution is 1ppm. Capacitance ratio linearity is better than 1ppm, and accuracy is 15 ppm fixed permanently. Accuracy essentially depends on turns ratio only. Measurements may be safely made into the megavolt region, as bridge components remain at or near ground potential.

An optional Model 9911 Range Extender is available. The 9911 is used to extend the range of the 9910A and for special use in shunt reactor loss measurement and power transformer testing applications. Constructed in two parts – toroid and primary bar, the model 9911 is a two-stage transformer with a 1000:1 ratio that can be extended to 1,000,000:1. A 1000 pF standard can then be used to measure capacitance values up to 1000 μ F. Maximum accuracy of the range extender is 3 ppm with bridge range at 1000:1 ratio.

9910A HIGH VOLTAGE CAPACITANCE AND INDUCTANCE BRIDGE

Null Detection is accomplished via a dual-phase lock-in amplifier supplied with the 9910A Bridge. The selected amplifier provides:

- Continuous full-scale sensitivity control – this control also includes a sensitivity vernier control, allowing the full scale sensitivity to be set to any value between the calibrated values.
- Unique Walsh Function Demodulators. The modulator multiplies the applied signal by a stepped approximation to the reference sinusoidal waveform.
- Powerful fourth-order signal channel Bandpass, Low Pass or Notch filter
- High Dynamic Reserve
- Two independent line frequency rejection filters
- Up to 130 dB Dynamic Reserve
- Synchronous 15-bit ADC for lower output jitter

5210 DUAL-PHASE LOCK-IN AMPLIFIER SPECIFICATIONS

Input Mode	Voltage	Single-ended or true differential
	Current	Virtual ground
Sensitivity	Voltage	10 nV to 3 V (with output expand)
	Current	10^{-6} A/V, 10^{-8} A/V Conversion
Impedance	Voltage	100M Ω // 25 pF
	Current	25 W (10^{-6} A/V)
Noise	Voltage	5 nV/ $\sqrt{\text{Hz}}$ @ 1 kHz
	Current	13 fA/ $\sqrt{\text{Hz}}$ (10^{-8} A/V) @ 1 kHz
CMRR		120 dB @ 1 kHz
Frequency Response		0.5 Hz to 120 kHz
Dynamic Reserve		130 dB (max)
Detection	Phases	1
	Modes	F, 2F
Output	Modes	X, Y (%): X, Y, (V): R, \emptyset , Noise
	Time Constant	100 μ S, 1 ms to 3000 S
	Roll-Off	6 or 12 dB/octave
	Voltage	10V FS
	Impedance	1 k Ω
Interface		RS232, GPIB (IEEE-488)
Auxiliary Control		4 ADC, 1 DAC

9910A HIGH VOLTAGE CAPACITANCE AND INDUCTANCE BRIDGE

9910A CAPACITANCE SPECIFICATIONS

Direct-Reading Capacitance:	(1:1 nominal ratio), 1.111,110 in steps of 0.000,001 (1 ppm)		
Direct Reading Dissipation Factor:	-0.110999 to +0.110999 in steps of 0.000,001 (1 ppm)		
Capacitance Decade Scaling Ratios:	1000, 500, 200, 100, 50, 10, 5, 2 and 1 to 1		
Current Rating:	Max bridge current through 10 mA through standard capacitor. Current through the measured capacitor is dependent on the capacitance ratio and is not the limiting factor		
Power Requirements:	120 V, 60 Hz, 150 W	240 V, 50 Hz, 150 W	Specify at Time of Order
Weight:	140 lbs	64.3 kgs	Dimensions 20" W x 22.5"D x 22" H 51 cm x 57cm x 56 cm

	Capacitance Ratio	Dissipation Factor
Bridge Resolution (All ranges at rated current)	1 ppm	1 ppm
Linearity	>1 ppm	0.1% of reading
Accuracy ¹ For D factors <0.1%	±15 ppm	±15 ppm
Accuracy ¹ For D factors up to 10%	±15 ppm (±0.005 x D Factor)	±1% of reading

Note 1: All ranges – capacitance dials at maximum

9910A INDUCTANCE SPECIFICATIONS

Typical ranges according to standard capacitance value C_s , Bridge nominal ratio, and Range Extender ratio

C_s	Bridge Ratio	Range Extender Ratio	Approx Max Inductance for 6 Digit Resolution	Max Inductor Current	Ratio Accuracy ¹
1000 pF	100:1	10:1	7 H	10 A	± 15 ppm
1000 pF	1000:1	1000:1	7 mH	1000 A	± 15 ppm
100 pF	100:1	10:1	70 H	10 A	± 15 ppm
100 pF	1000:1	1000:1	70 mH	1000 A	± 15 ppm

Note 1: 9911 Accuracy not included.

9911 RANGE EXTENDER SPECIFICATIONS

Maximum Primary Current:	1000A
Maximum Working Voltage:	50 kV
Turns Ratio:	1000:1 / 10:1

Weight Primary Bar	45 lbs	20.5 kg
Weight Toroid	130 lbs	59 kg

Bridge Range	Burden	Accuracy
X1000	0.04 Ω	± 3 ppm
X500	0.01 Ω	± 5 ppm
X200	0.2 Ω	± 10 ppm
X100	0.4 Ω	± 25 ppm

ORDERING INFORMATION

9910A	AC High Voltage Capacitance and Inductance Bridge
/60Hz	60 Hz Test Frequency
/50Hz	50 Hz Test Frequency
/Dual	50 and 60 Hz Test Frequencies
/TM	Technical Manual (Included)
	Specify Operating Voltage and Frequency (eg 120V @ 60 Hz)

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