

Industry Leading Reference for Ratio Calibration of Capacitance Measurement Instruments!



**Guildline's Instruments 99100A Capacitance Reference System** provides for ratio calibration of Capacitance Measurement Systems. The 9100A System comprises a number of highly stable hermetically sealed capacitors with a switch array and a variable high voltage supply. The unique design allows the instrument to be used as a reference for ratio calibration of capacitance measurement instruments. Provision is made for an additional external reference capacitor and also for additional extension of the switched array range with another bank of reference capacitors.

**PROVIDING REFERENCE RATIO CALIBRATION OF CAPACITANCE MEASUREMENT SYSTEMS WITH UNCERTAINTY AS LOW AS 20 PPM!**

The switched array and power supply are housed in a bench top rack cabinet assembly with room for expansion. The switch array allows various combinations of capacitance to be connected in parallel to one of two output connectors. It is only the low side of the capacitors that are switched.

### FEATURES

- Supports 9910A Capacitance Bridge
- Ratio Transfer Uncertainty Low as 3 ppm
- Better than  $\pm 20$  ppm Stability
- Calibration Uncertainty  $\pm 10$  ppm
- Working Voltage to 800 Vrms
- Temperature Coefficients  $< 4$  ppm/ $^{\circ}\text{C}$
- Very Low Voltage Coefficients
- Provides Ratio Calibration from 1:1 to 100:1
- Requires Very Little Maintenance

The high side of all the capacitors are connected to the high voltage source. Each capacitor low side is either switched from ground or to one of the output terminals. In this way, the loading on the voltage source remains the same regardless of the capacitor combination.

The system provides eleven, highly stable, capacitor values of 1000 pf and one value of 100 pf to provide for dial line up and ratio calibration from a ratio of 1:1 to 100:1.

The capacitors in the switched array may be calibrated individually against a known standard capacitance by direct comparison using a capacitance bridge. Since the switched array is normally used as a ratio metric device, actual capacitance values are normally not required to be known to a high level of accuracy (i.e. low uncertainty).

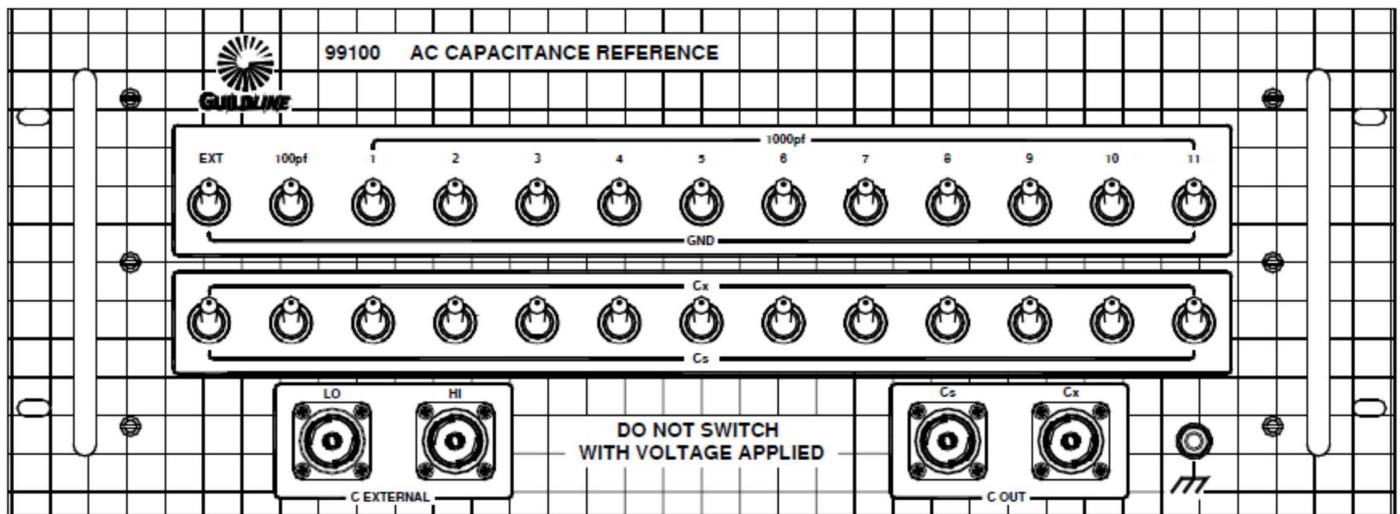
Test Voltages to 800 Vrms continuously variable with a minimum resolution of 1 Volts are available

# 99100A Capacitance Reference System

The 99100A System is easy to operate. Simply make connections to the bridge (using GR784 Type Connectors), set up the appropriate ratio using the 2 banks of switches on the Reference (shown below), and then set up the AC Voltage using the 99102 AC Voltage Source.

The top row of switches allows connection of the low voltage side of the capacitors, including an external value, to the ground of the system when the switches are set downward; or to one of the Cx or Cs output terminals when set in the upward direction. There are eleven 1000 pf capacitors, one 100 pf value and a switch for any external value that is connected to the C External terminals.

Switched Array Module Front View



The bottom row switches connect the selected capacitors, as determined in the top row selections, to either the Cs or Cx terminals on the front panel. In the upward setting the selected capacitors are connected to the Cx Out terminal. With the switches set in the downward position, the selected capacitors are connected to the Cs Out terminal.

The C External terminals allow for the connection of an external capacitor to the switched array. The LO terminal is connected internally to the EXT switch on the top row of switches and can be switched to ground or to either Cs or Cx Out terminals. The HI terminal is connected to the high voltage source.

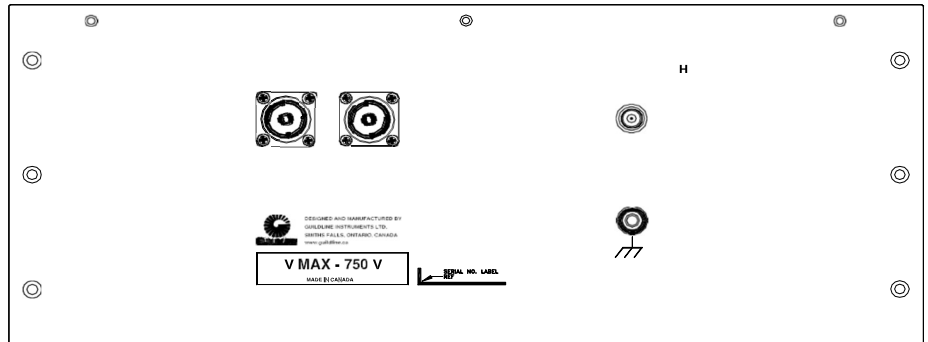
Two switched output terminals are provided to allow connection to the bridge to be calibrated. The LO end of the capacitors can be switched to either output terminal by the bottom row of selection switches. A binding post terminal bonded to the chassis of the system is provided on the front panel. This terminal should be connected to the ground terminal of the instrument being calibrated.

Since the switched array is normally used as a ratiometric device, actual capacitance values are normally not required to be known to a high level of accuracy (i.e. low uncertainty).

The instrument requires very little maintenance other than periodic dusting of the outside of the enclosure and ensuring the cabling is in good condition.

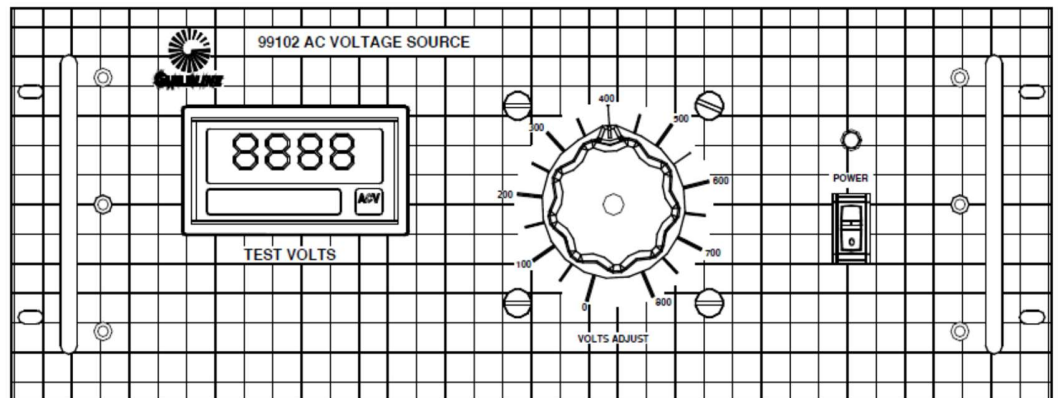
### Switched Array Module Rear View

The high voltage input connector is provided for connection to the high voltage source. There are a set of two terminals to allow connection of a second switched capacitor array module into the system. These terminals are in parallel to the front panel C Out terminals. A separate binding post terminal bonded to the chassis of the system is provided on the front panel. This terminal should be connected to the ground terminal of the instrument being calibrated.



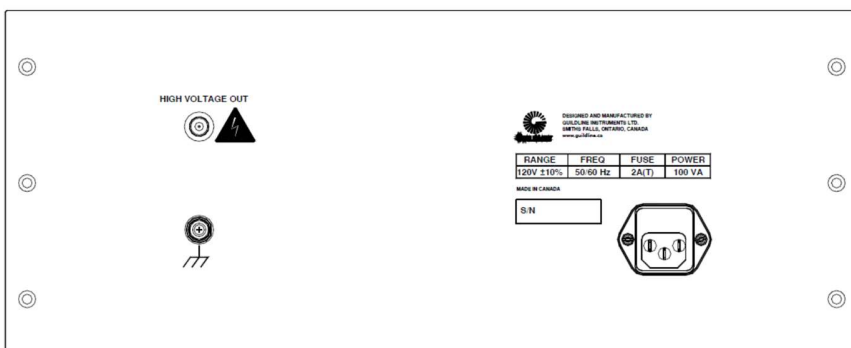
### Voltage Source Module Front View

The power indicator lights whenever the power switch is enabled and the voltage source module is connected to a source of power. The Volts Adjust Knob allows for setting of the test voltage from 0 to up to 800 Vac. The Test Volts indicator shows the RMS value of the test voltage being applied to the switched array module. The test voltage should not be set any higher than 750Vrms.



The Rear of the Voltage Source Module contains the Power Entry Module, a High Voltage Output Connector and a Ground Terminal. The power entry module allows for connection to a source of AC power to operate the Capacitance Reference System voltage source. Note that the system is set for 120Volts AC and cannot be modified in the field. The power entry module also houses the over current protective fuse. The high voltage output connector supplies the test voltage to the switched array. A cable is provided to make the connection between the two units. A

### Voltage Source Module Rear View



ground terminal bonded to the voltage source module is provided for connection to the instrument being calibrated. A similar connection is provided on the front of the switched array module.

# 99100A Capacitance Reference System

99100A GENERAL SPECIFICATIONS			
High Voltage Source Range	0 to 800 VAC (Set Via 99102 AC Voltage Source Unit)		
Operating Humidity (non-condensing)	< 70% RH	Storage Humidity (non-condensing)	< 90% RH
Operating Temperature	23 °C ± 5 °C		73 °F ± 9°F
Storage Temperature	-20 °C to +60 °C		-4 °F to +140 °F
Voltage/Frequency Requirements	120 VAC ± 10%		50 or 60 Hz ± 5%
Dimensions (Nominal)	31.5" (D) x 21.0" (W) x 21.8" (H)		800mm (D) x 533mm (W) x 553mm (H)
Weight	160 lbs		73 kG

99100A CAPACITANCE SPECIFICATIONS						
Nominal Capacitance (pf)	Nominal Initial Tolerance <sup>1</sup> (± ppm)	Calibration Uncertainty <sup>2</sup> (± ppm)	Quantity (Units)	Stability 12 months (± ppm)	Temperature Coefficient (± ppm/°C)	Maximum Voltage (VAC <sub>rms</sub> )
1000	25	10	11 (1000 pf)	20	4	750
10	25	10	1 (100 pf)	20	4	750

**Note 1:** Nominal initial tolerance is defined as the maximum variation of capacitance mean values as initially adjusted at the point of sale.

**Note 2:** Calibrated in ambient conditions of 23°C, referred to the unit of capacitance as maintained by the National Measurement Institute, and expressed as a total uncertainty with a coverage factor of k = 2.

## Unparalleled Support

Guidline Instruments provides an **industry leading two year warranty** on this device and all associated resistance standards. We know that the 99100 A **will work for you** out of the box and in the future... and we back it up.

ORDERING INFORMATION	
99100A	Capacitance Reference System
/TM	Technical Manual (Included)
	Specify Operating Voltage and Frequency (eg 120V @ 60 Hz)

**GUILDLINE IS DISTRIBUTED BY:**

