The Model 101 Picoammeter

With Low-Voltage Bias Source

- USB interface
- 2 nA to 20 mA full scale
- 1 fA resolution
- 6½ digit resolution
- < 100 µV burden voltage
- Up to 3500 readings per second
- AutoZero drift compensation
- All solid-state range switching
- 300 V isolation from chassis
- 0 to ±10 V 20 mA bias source
- 0 to ±250 V 1 mA bias source
- LabVIEW™ and .NET drivers
- Programmable digital I/O
- Easy and intuitive user interface

The Model 101 Picoammeter couples fast and accurate measurements in a low-cost instrument. It provides ranges, resolution, and accuracy that often exceed those typically found in more expensive instruments for legacy suppliers, providing quiet, stable measurements and fast response times.

Technical Features

AutoZero Function. The unit is equipped with an AutoZero function that ensures that the input burden voltage remains as close to zero as possible, thus compensating for time and temperature induced drifts.

Solid State Switching. Solid state range switching eliminates the uncertainties associated with electromechanical relays.

Isolation. The Model 101 can float up to ±300 V from Earth ground permitting accurate high-side current measurements.

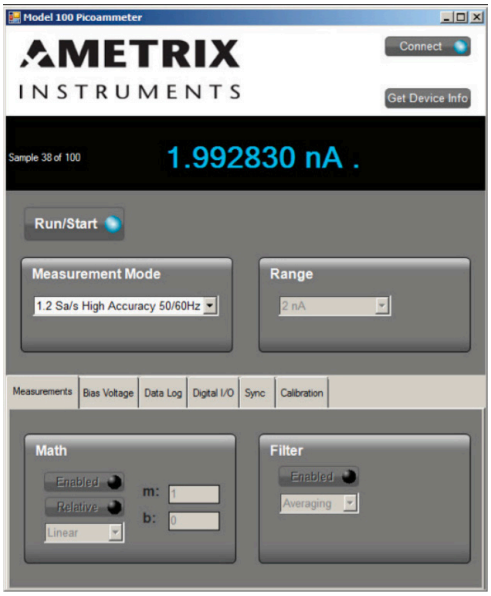
Data Interface. The unit is equipped with an USB interface that is easier to use, more cost effective than GPIB or RS-232 and eliminates non-native operating system support, expensive GPIB cards and expensive cables.

Bias Supply. The quiet programmable voltage bias supplies ensure stable current measurements. These supplies have fine resolution to allow precise adjustment. The voltages can be monitored by the measurement system to verify the actual voltages and the included interlock connector can be used to disable the supplies when the device is under test is being installed in a fixture. The high voltage bias supply can be used for biasing silicon photo-diodes, biasing avalanche photo-diodes, characterizing the low current regions of semiconductors, and high-megohm resistance measurements.

Data Display. The Model 101 Picoammeter leverages the user's computer for data display since typically users use their PC for storage, analysis, or reporting, rendering an additional display redundant.

Soft Front Panel. The intuitive user interface provides control, display, and data logging functions.

User Created Interface. The Model 101 Picoammeter provides powerful APIs for data acquisition and control. Support for user-written software in Visual Studio® or LabVIEW™.



The very intuitive and easy-to-use Soft Front Panel

Digital I/O. The digital I/O interface, can be configured to drive selected pins based on measurement levels, which is ideal for alarms and part binning. Users can control the digital I/Ovia scripted commands or buttons within the user interface. The digital I/O lines are compatible with traditional TTL signal levels and can detect up to +24 V logic levels or sink 24 V loads at up to 200 mA.

Model 101 Specifications*

Range	Range Resolution	Accuracy[1, 2] (1 yr) 23 °C ±5 °C ±(% rdg + offset)	RMS Noise Typical[1]
2 nA	1 fA	0.3 + 400 fA	56 fA
20 nA	10 fA	0.2 + 1 pA	56 fA
200 nA	100 fA	0.1 + 10 pA	2.4 pA
2 µA	1 pA	0.1 + 100 pA	2.4 pA
20 µA	10 pA	0.08 + 1 nA	255 pA
200 µA	100 pA	0.08 + 10 nA	255 pA
2 mA	1 nA	0.06 + 100 nA	26 nA
20 mA	10 nA	0.06 + 1 µA	26 nA

1. At 1.9 measurements per second
2. All specifications assume that the temperature is ±5 °C of last AutoZero and within one year of last factory calibration

MEASUREMENTS

Input Voltage Burden: < 100 µV on all ranges except 20 mA range < 1 mV with AutoZero enabled
Maximum Common Mode Voltage: 300 V to chassis
Maximum Voltage Between Inputs High & Low Without Damage: 250 V
Meter Low-to-Chassis Isolation: greater than 10^{11} Ω || 4 nF
NMRR: > 100 dB at 50/60 Hz at integer line cycle sample rates
Temperature Coefficient Outside of 23 °C ±5 °C: include an additional 0.05 x % rdg / °C to the accuracy specification
Measurement Rates: 1.9, 7.7, 39, 45 measurements per second with line cycle noise rejection 150, 300, 900, 1800, 3500 measurements per second for higher speed
Maximum Input Capacitance: Stability guaranteed up to 100 nF
Input Connector: Safety BNC

LOW-VOLTAGE BIAS SUPPLY

Output Range: 0 to ±10 V, with 0 to ±20 mA load
Output Accuracy: ±(0.1% of setting +6.0 mV)
Output Noise: 1 mV P-P 0-10 Hz
Output Resolution: 2.5 mV
Output Measurement Accuracy: ±(0.05% of setting +2.5 mV)
Output Measurement Resolution: 300 µV

DIGITAL I/O

Channels: 8 individually programmable lines
Input Logic Levels: Low: 0 to +0.75 V, High: 2.4 V to +24 V
Output
Low: < 10 Ω to digital I/O common, can sink up to 200 mA with load connected to external power ≤ +24 V
High: 1 kΩ pull up to +5 V
Digital I/O common is chassis ground

ENVIRONMENTAL

Operating Temperature: 0 °C to 50 °C
Storage Temperature: -40 °C to 70 °C
Humidity: non-condensing
Environmental: IP41
Altitude: < 2000 meters
Pollution Degree: 2

GENERAL SPECIFICATIONS

Communications: USB 2.1 full-speed mode
Vibration: MIL STD 810E Category 1 and 10
Safety: IEC/EN 61010-1:2010
EMC Compliance: IEC61326-1:2005
Power:
The Model 101 does not draw power from the USB port. It must be powered by the included external power supply or from any external 7 VDC to 32 VDC supply.
External Power: connector XLR
Power Consumption: < 6 W
Dimensions: 43.7 mm high x 216 mm wide x 254 mm depth (1.72 in x 8.5 in x 10.0 in)
Weight: 430 g (0.95 lb)
Calibration cycle: 1 year
Warm-up Time: 15 minutes to 2 °C of final operating temperature

INCLUDED

- CD with software and manual
- PS1 100 V to 250 V 50/60 Hz input power supply
- USB cable 1 m

ACCESSORIES

The Model 100 Series can be expanded with a variety of accessories:

Current Calibrator: NIST traceable kit for calibrating the current ranges of a Model 100 Series; BNC cable, banana cables included**

Pwr-1: Mains to 12 V supply with power cable and output cable for Model 100 Series

Cable-2: USB Male A to Male B

Cable-3: 1-XLR-F to 3-XLR-M allows up to 3 Model 100 Series to be powered by one power supply

Cable-4-L: Safety BNC to Safety BNC, (user-specified length) of RG58U cable

Cable-5: 15-pin HD D-Sub, male-to-male, digital I/O cable, 1.5 m

* Specifications shown on **www.ametrixinst.com** supersede all others and are subject to change without notice.

** For all models, user must supply a traceable DMM, Keysight Technologies Model 34401, or Keithley Model 2000, or better. For a Model 100 an external 0 V to ±10 VDC calibrator is required; Models 101 and 102 use the internal low-voltage bias supplies.

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