Model 121 Programmable Current Source



Model 121 features

- 6 decades of output current, selectable in 13 ranges
- Programmable current output, 100 nA to 100 mA
- Low-noise output
- Large 3 digit LED display
- Simple user interface
- Current reversal feature
- USB interface enables integration with automated test systems
- DIN panel mountable package
- Detachable output terminal block
- CE certification
- Full 3 year standard warranty

Introduction

The Model 121 programmable current source is a precision instrument suitable for bench-top use or panel-mounted operation in labs, test facilities, and manufacturing environments. It provides a low noise, highly-stable source of current up to 100 mA, with convenient manual selection through 13 pre-set output levels, each representing a ten-fold change in power when attached to a resistive load. A "user" setting allows the current output to be defined anywhere within the operating range of the unit, from 100 nA to 100 mA.

Fully automated operation is also possible via the instrument's USB computer interface, through which the Model 121 can be commanded to output any desired current at any time. Thus, application-specific test patterns can be created.

The instrument operates at 5 VDC, and power is supplied by the external AC wall-mount supply provided with the standard Model 121. The supply will automatically conform to any AC line voltage ranging from 100 VAC to 240 VAC, 50 to 60 Hz.

Applications

The Model 121 current source is ideally suited for testing, measuring, and operating resistive and semiconductor devices, such as:

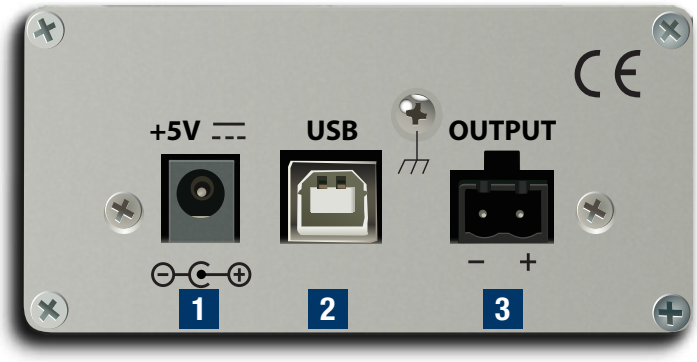
- Lake Shore Cernox® temperature sensors
- Other resistance temperature detectors (RTDs) such as platinum sensors
- Diode temperature sensors, including Lake Shore DT-670s
- LED devices
- Hall sensors used for magnetic field measurement

An accurate, stable source of current is key to ensuring consistent operation of these devices, where the voltage drop across the device can be dependent upon temperature, magnetic field, and other parameters. The instrument's wide output range is of great value when used with RTD-type sensors whose resistance can vary with temperature by as much as 6 orders of magnitude. The current reversal feature enables compensation for thermal EMF, important for accurately measuring resistors at very low excitation levels. Example applications include:

- Basic device QC ("good/bad" verification)
- LED brightness testing (constant device current)
- Temperature sensor calibration (determine resistance at fixed calibration points)
- Temperature measurement (using a voltmeter readout)
- Magnetic sensor calibration and measurement
- Semiconductor device measurements (IV curves for diodes, transistors, etc.)
- Circuit prototyping (fixed current source)
- Small scale electro-chemical applications

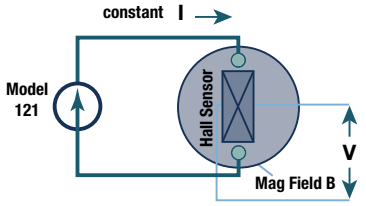
Whether operating over a wide range of environmental conditions, establishing precise sensor calibrations or simply testing devices for conformance, the Model 121 provides a convenient and reliable alternative to simple voltage-based circuits, and a very affordable alternative to more expensive multi-function current sources. It can be readily integrated into automated test systems using its built-in USB computer interface and offers a highly readable, simple-to-use operator display.

Model 121 rear panel

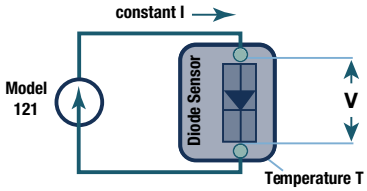


1
Power input connector
2
USB interface
3
Output current

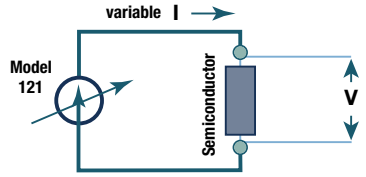
Model 121 possible applications



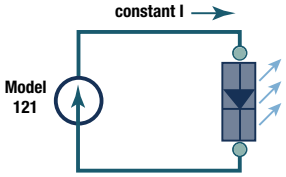
Hall mag field sensor
Test/calibration/measure
(V varies with B)



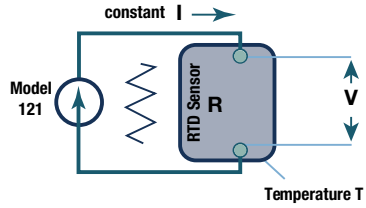
Diode temperature sensor
Test/calibration/measure
(V varies with T)



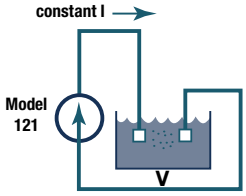
Semiconductor device
IV curve measurement
(V varies with I)



LED
Brightness test/measure
(independent of voltage drop)

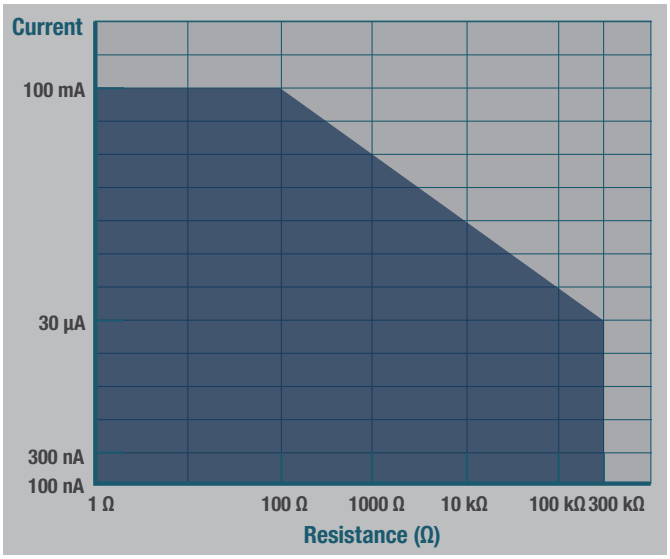


RTD temperature sensor
Test/calibration/measure
(R=V/I, R varies with T)

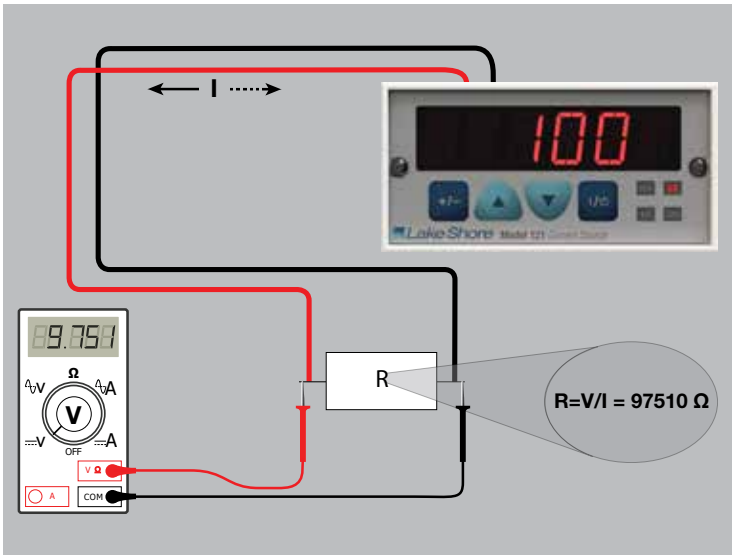


Electrochemistry applications
Plating, titration, potentiometry

Application range of Model 121



Using the Model 121 with a resistive device/sensor



Output

Type: Bipolar, DC current source

Current ranges: 13 fixed ranges of 100 nA, 300 nA, 1 µA, 3 µA, 10 µA, 30 µA, 100 µA, 300 µA, 1 mA, 3 mA, 10 mA, 30 mA, 100 mA, plus a user programmable range

Accuracy: 0.05% on 10 µA range, 0.5% on 100 nA and 300 nA ranges, 0.1% on all other ranges

Compliance voltage: ±11 V up to 30 mA, 10 V up to 100 mA

AC current ripple: Less than 0.1% on 100 nA and 300 nA ranges, Less than 0.01% on all other ranges in properly shielded system

Current ripple frequency: Dominated by the switching power supply line frequency/harmonics

Temperature coefficient: 0.03% of range/°C for the 100 nA range, 0.01% of range/°C for all other ranges

Line regulation: Less than 0.01% change in output for 5% change in the DC input voltage

Load regulation: Less than 0.01% change in output current over the full range scale

Stability (24 h): ±0.05% on 100 nA range, ±0.01% per day on all other fixed ranges

Connections: Detachable terminal block

Maximum load: 300 kΩ

Maximum lead length: 50 ft



2111 Single 1/4 DIN panel-mount adapter, 105 mm W × 132 mm H (4.1 in × 5.2 in)



2112 Dual 1/4 DIN panel-mount adapter, 105 mm W × 132 mm H (4.1 in × 5.2 in)

User setting

Programming

Operation:	Output current settable via computer interface
Resolution:	3 significant digits
Accuracy:	±0.5% of 100 nA and 300 nA ranges, ±0.25% of all other ranges
Maximum current:	100 mA
Minimum current:	100 nA

Front panel

Display:	LED – 3 digits plus sign
Display units:	mA, µA, and nA
Display update rate:	2 rdg/s
Display anunciators:	mA, µA, nA, and compliance
Keypad:	4 full travel keys
Keypad functions:	Range Up, Range Down, Current Polarity, Output Inhibit

Interface

USB	
Function:	Emulates a RS-232 serial port
Baud rate:	57,600
Connector:	B-type USB connector
Reading rate:	To 10 rdg/s
Software support:	LabVIEW™ driver (see www.lakeshore.com)

General

Ambient temperature: 15 °C to 35 °C at rated accuracy; 5 °C to 40 °C at reduced accuracy

Power requirement: +5 VDC ±5% at 400 mA, barrel plug 5.5 mm OD × 2.1 mm ID × 9.9 mm L, center pin positive

Size: 96 mm W × 48 mm H × 166 mm D (3.8 in × 1.9 in × 6.5 in)

Mounting: Panel mount into 91 mm W × 44 mm H (3.6 in × 1.7 in) cutout

Weight: 0.45 kg (1 lb)

Approval: CE mark

Power supply (109-132)

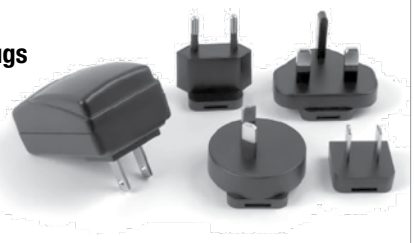
Comes standard with interchangeable input plugs

Power requirements 100 to 240 VAC, 50 or 60 Hz, 0.3 A max

Output +5 V at 1.2 A

Size 40.5 mm W × 30 mm H × 64 mm D (1.6 in × 1.2 in × 2.5 in)

Weight 0.15 kg (0.33 lb)



Ordering information

Part number	Description
121	Programmable current source—includes one 100 V to 240 V, 10 W power supply with universal input interchangeable input plugs (109-132), calibration certificate, and user manual
121N	Programmable current source—no power supply. Includes calibration certificate and user manual
2111	Single 1/4 DIN panel-mount adapter
2112	Dual 1/4 DIN panel-mount adapter

Accessories

CAL-102-CERT	Model 121 recalibration with certificate

All specifications are subject to change without notice