

Specifications

4142B Modular dc Source Monitor

Ground Unit (GNDU):

Use as measurement ground
0 V, Kelvin connection

Offset voltage: $\pm 500 \mu\text{V}$ max

Current voltage: $\pm 1.6 \text{ A}$

Maximum cable resistance:

FORCE terminal: $\leq 1 \Omega^*$

SENSE terminal: $\leq 10 \Omega^*$

Maximum capacitive load: $10 \mu\text{F}$ max*

Spot Measurements: Source and monitor DC current or voltage

Swept Measurements:

- One channel can sweep current or voltage while up to 8 channels measure current or voltage
- A second sweep channel can be slaved to the first sweep channel (dual synchronous sweep)

Sweep modes: Linear or logarithmic

Single or double staircase

Sweep parameters: Start, stop, number of steps, or steps per decade

Maximum number of steps: 1000

Hold time: 0 to 655.35 s, 10 ms resolution

Delay time: 0 to 65.535 s, 1 ms resolution

Setting accuracy: $0.5\% + 1 \text{ ms}^*$

Measurement Unit

HP 4142B Modules

Model number	Slots req'd	Voltage range	Current range	Measurement resolution	Accuracy	
					V	I
HP 41420A SMU ¹	2	$\pm 100 \mu\text{V}$ to $\pm 200 \text{ V}$	$\pm 50 \text{ fA}$ to $\pm 1 \text{ A}$	$40 \mu\text{V}$ 20 fA	0.05%	0.2%
HP 41421B SMU ¹	1	$\pm 100 \mu\text{V}$ to $\pm 100 \text{ V}$	$\pm 50 \text{ fA}$ to $\pm 100 \text{ mA}$	$40 \mu\text{V}$ 20 fA	0.05%	0.2%
HP 41422A HCU ¹	2	$\pm 200 \mu\text{V}$ to $\pm 10 \text{ V}$	$\pm 500 \mu\text{A}$ to $\pm 10 \text{ A}$	$40 \mu\text{V}$ 20 μA	0.5%	0.5%
HP 41423A HVU ¹	2	$\pm 10 \text{ mV}$ to $\pm 1000 \text{ V}$	$\pm 50 \text{ pA}$ to $\pm 10 \text{ mA}$	2 mV/2 pA	0.5%	1%
HP 41424A VS/MMU ¹	1	$\pm 1 \text{ mV}$ to $\pm 40 \text{ V}$	$\pm 20 \text{ nA}$ to $\pm 10 \text{ mA}$	$4 \mu\text{V}$ 20 μA	0.05%	3%
HP 41425A AFU ¹	1	Searches for a specified current or voltage on one SMU by controlling the voltage output of another SMU.				

¹ Provides Kelvin connections (remote sensing).

² Differential measurement mode ($40 \mu\text{V}$ resolution in normal mode).

SMU Range, Resolution and Accuracy (at 18° to 28° C)

Voltage range	Set res.	Meas. res.	Accuracy	Max. current
$\pm 2 \text{ V}$	$100 \mu\text{V}$	$40 \mu\text{V}$	$\pm 0.05\% \pm 1 \text{ mV}$	1 A
$\pm 20 \text{ V}$	1 mV	$400 \mu\text{V}$	$\pm 0.05\% \pm 10 \text{ mV}$	1 A ($V \leq 14 \text{ V}$) 0.7 A ($V > 14 \text{ V}$)
$\pm 40 \text{ V}$	2 mV	$800 \mu\text{V}$	$\pm 0.05\% \pm 20 \text{ mV}$	350 mA
$\pm 100 \text{ V}$	5 mV	2 mV	$\pm 0.05\% \pm 50 \text{ mV}$	125 mA
$\pm 200 \text{ V}$	10 mV	4 mV	$\pm 0.05\% \pm 100 \text{ mV}$	50 mA

Current range	Set res.	Meas. res.	Accuracy	Max. voltage
$\pm 1 \text{ nA}$	50 fA	20 fA	$\pm 1\% \pm (0.1 + 0.2 \times \text{Vo}/100)\%$	200 V 200 V ($I < 50 \text{ mA}$) 100 V ($I > 50 \text{ mA}$) 200 V ($I \leq 50 \text{ mA}$) 100 V (125 mA $\leq I \leq 50 \text{ mA}$) 40 V (350 mA $\leq I \leq 125 \text{ mA}$) 20 V (0.7 A $\leq I \leq 350 \text{ mA}$) 14 V ($I > 0.7 \text{ A}$)
$\pm 10 \text{ nA}$	500 fA	200 fA		
$\pm 100 \text{ nA}$	5 pA	2 pA	$\pm 0.5\% \pm (0.1 \times 0.2 \times \text{Vo}/100)\%$	
$\pm 1 \mu\text{A}$	50 pA	20 pA		
$\pm 10 \mu\text{A}$	500 pA	200 pA	$\pm 0.2\% \pm (0.1 + 0.2 \times \text{Vo}/100)\%$	
$\pm 100 \mu\text{A}$	5 nA	2 nA		
$\pm 1 \text{ mA}$	50 nA	20 nA		
$\pm 10 \text{ mA}$	500 nA	200 nA		
$\pm 100 \text{ mA}$	5 μA	2 μA		
$\pm 1 \text{ A}$	50 μA	20 μA	$\pm 0.5\% \pm (0.1 + 0.2 \times \text{Vo}/100)\%$	

* Note: Vo is the SMU output voltage, in volts.

Pulsed Measurements (SMU)

Force and measure pulsed current or voltage

Ranges: 2 V range: 10 nA to 1 A range

20 V to 200 V range: $100 \mu\text{A}$ to 1 A range

V pulse: 2 V range: 1 compliance $\geq 2 \text{ nA}$

20 V to 200 V range: 1 compliance $\geq 20 \mu\text{A}$

I pulse: 10 nA to $10 \mu\text{A}$ range: V compliance $\leq 2 \text{ V}$

$100 \mu\text{A}$ to 1 A range: V compliance $\leq 200 \text{ V}$

Pulse width: 1 to 50 ms, $100 \mu\text{s}$ resolution

Pulse period: 10 to 500 ms, $100 \mu\text{s}$ resolution

Setting accuracy: $0.5\% + 100 \mu\text{s}^*$

Pulsed Sweeps

- Sweep and measure pulsed current or voltage
- Sweep dc current or voltage while pulsing current or voltage. Use Pulse and Sweep specification

Memory

Program memory: Stores approximately 2000* HP-IB commands, which can be grouped into 99 subroutines.

Data memory: 4004 measurement points (binary)
1001 points (ASCII format)

General Specifications

Auto Calibration: Automatically calibrates the offset errors in each measurement unit every 30 minutes*

Environmental Information

Operating temperature: 5° to 40° C

Allowable temperature drift: $\pm 3^\circ \text{ C}^*$

Operating humidity: 5% to 80% RH

Storage temperature: -40° to 65° C

Storage humidity (at 65° C): $\leq 90\%$ RH

Operating inclination: $\pm 20^\circ$ from horizontal

Power: 100/120/220 V, $\pm 10\%$; 240 V $10\% + 5\%$; 48 to 66 Hz, 750 VA max.

Size: 426 mm W \times 235 mm H \times 676 mm D

Weight

HP 4142B: Approximately 23 kg

HP 41420A/41422A/41423A: Approximately 3 kg

HP 4142B/41424A/41425A: Approximately 2 kg

Recommended Computer

HP 9000 Series 300

BASIC operating system (Version 3.0 or later)

Software

Parameter measurement library: Current Gain, Breakdown Voltage (2), Drain Current, Threshold Voltage (3), and Resistance
Test instruction set: Initialize, Force, Measure, Pulse, Graphics, and Data Storage

* Reference data only.

Ordering Information

	Price
HP 4142B Modular dc Source/Monitor	\$12,100
Opt 300 Install Control Unit for Module Selector	\$430
Opt 302/303 Control Cable	\$130/110
Opt 400 Install 41420A (needs 2 slots)	\$4,730
Opt 402/403 Quadaxial Cable for 41420A	\$600/500
Opt 410 Install 41421B (needs 1 slot)	\$3,910
Opt 412/413 Quadaxial Cable for 41421B	\$600/500
Opt 420 Install 41422 A (needs 2 slots)	\$5,000
Opt 422/423 Dual Coaxial Cable for 41422A	\$540/490
Opt 430 Install 41423A (needs 2 slots)	\$6,500
Opt 432/433 Triaxial/BNC Cable for 41423A	\$580/510
Opt 440 Install 41424A (needs 1 slot)	\$3,560
Opt 442/443 Coaxial Cable for 41424A	\$340/320
Opt 450 Install 41425A (needs 1 slot)	\$1,900
HP 41420A Source/Monitor Unit	\$4,730
Opt 402/403 Quadaxial Cable	\$600/500
HP 41421B Source/Monitor Unit	\$3,910
Opt 412/413 Quadaxial Cable	\$600/500
HP 41422A High-Current Source/Monitor Unit	\$5,000
Opt 422/423 Dual Coaxial Cable	\$540/490
HP 41423A High-Voltage Source/Monitor Unit	\$6,500
Opt 432/433 Triaxial/BNC Cable	\$580/510
HP 41424A Voltage Source/Voltage Monitor Unit	\$3,560
Opt 442/443 Coaxial Cable	\$340/320
HP 41425A Analog Feedback Unit	\$1,900
HP 16087A Module Selector	\$1,300
HP 16088B Test Fixture	\$4,300
Opt 010 Module Set for Power Devices	\$690
Opt 300 Add Module Selector	\$650