

Technical Information

Source Measurement Unit (SMU) Instruments

All of Keithley's source measurement unit (SMU) instruments can source voltage while measuring current and source current while measuring voltage. Some also measure resistance. All are fully programmable instruments that can stand alone as complete source, measurement, and automation solutions. They are also easy to integrate into larger systems.

Keithley's SMU instruments are faster, easier to use, and more economical than using individual power supplies and measurement instruments that are harnessed together. Additionally, they provide more accurate and repeatable results. Keithley's SMU instruments are ideal for production and automation, yet precise and sensitive enough for laboratory applications.

Keithley's SMU instruments include our Series 2400 SourceMeter[®] instruments, Series 2600A System SourceMeter instruments, Model 237 High-Voltage Source-Measure unit, and Model 4200-SCS Semiconductor Characterization System.

How does an SMU instrument work?

SMU instruments can be used as stand-alone constant voltage or constant current sources and as stand-alone voltmeters or ammeters. However, their real strength is their ability to simultaneously source and measure—applying voltage to a device under test (load) and measuring the current flowing through it, or supplying current to a load and measuring the voltage drop across it.

The SMU instrument topology (Figure 1) protects the device under test (DUT) from damage due to accidental overloads, thermal runaway, and other problems. Both the current and voltage source are programmable with readback to maximize device measurement integrity. If the readback reaches a programmed compliance limit, then the source is clamped at the limit, providing fault protection.

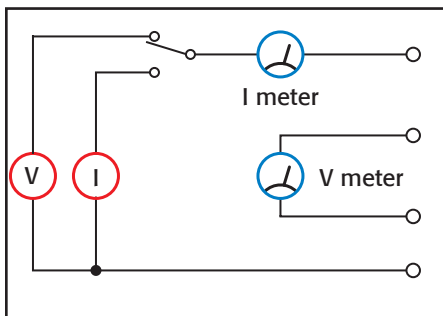


Figure 1. Basic SMU instrument topology

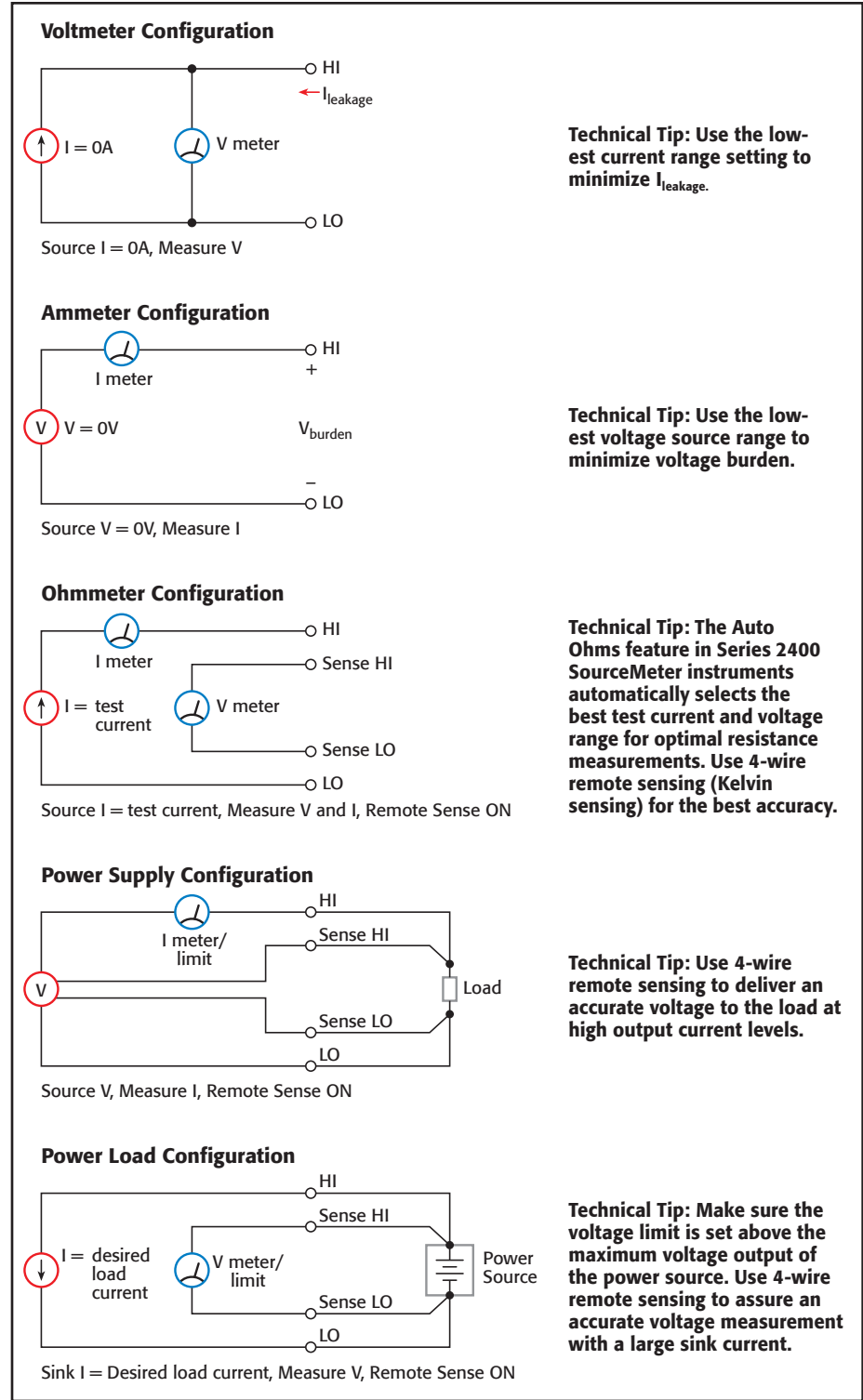


Figure 2. SMU instrument configurations

Technical Tip: Use the lowest current range setting to minimize I_{leakage} .

Technical Tip: Use the lowest voltage source range to minimize voltage burden.

Technical Tip: The Auto Ohms feature in Series 2400 SourceMeter instruments automatically selects the best test current and voltage range for optimal resistance measurements. Use 4-wire remote sensing (Kelvin sensing) for the best accuracy.

Technical Tip: Use 4-wire remote sensing to deliver an accurate voltage to the load at high output current levels.

Technical Tip: Make sure the voltage limit is set above the maximum voltage output of the power source. Use 4-wire remote sensing to assure an accurate voltage measurement with a large sink current.