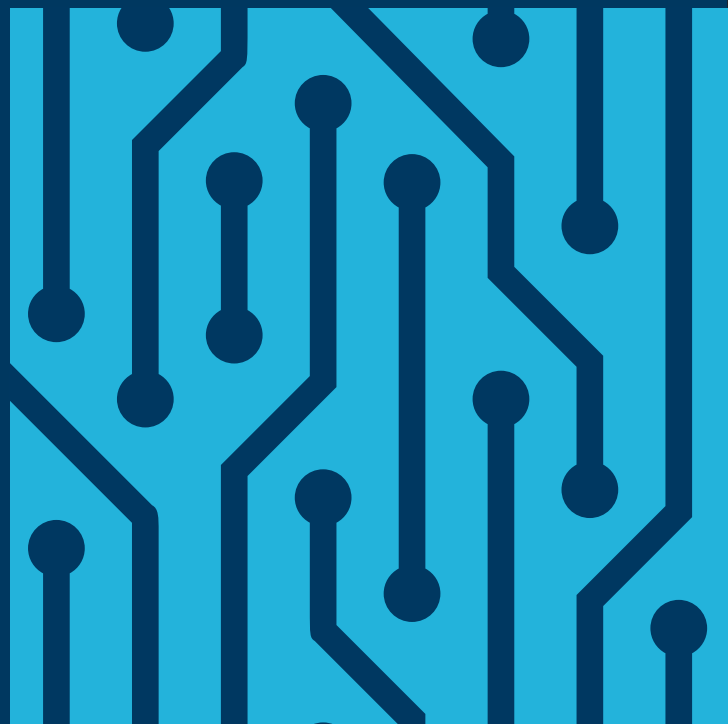


Application Note #22

Resistance Measure- ment With Source-Sink QL Series

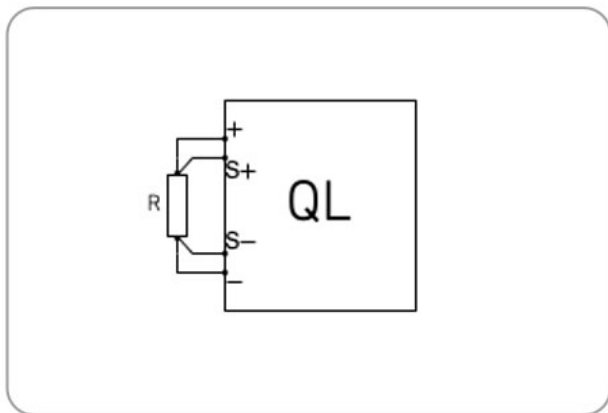


Depending on the current and voltage range, the QL source-sink series is suitable as a measuring device for verifying resistance values in the double-digit ohm range down to the milliohm range.

An outstanding advantage is that, depending on the resistance, the measurement can also be carried out under rated power conditions. This allows the resistance to be determined during actual use or testing, even when heated, which enables particularly practice-oriented measurement results.

Principle of Resistance Measurement

When the source-sink is operated as a constant current source, the resistance value is determined according to the principle of indirect resistance measurement. The sense lines are used to measure the voltage so that any wire resistances or contact resistances at the terminals are not measured and the measurement result is not distorted. This is particularly important for low resistance values in the milliohm range. Route the sense lines of the source-sink separately from the load lines directly to the test object. Resistance measurement can be performed in current mode or voltage mode.



Schematic for resistance measurement

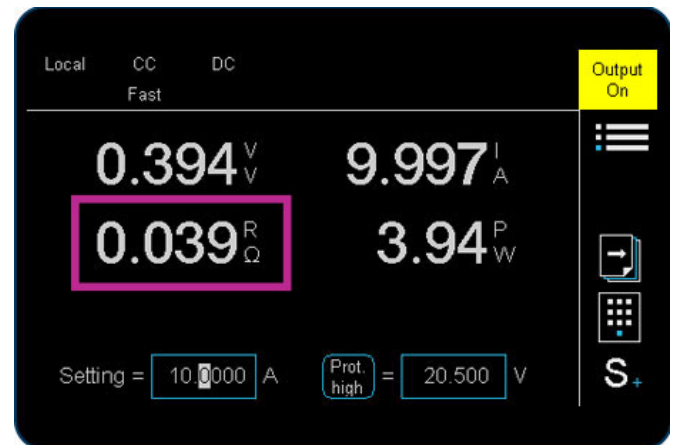
Safety Instructions



Before starting operation, read the user manual for the source-sink, in particular the General Safety Instructions and the safety instructions for connecting the test object!

Reading the Resistance Value

The measured value can be read locally via the user interface or externally via a data interface, whereby the interface query supplies the value with higher resolution.



SCPI command for reading via data interface:
MEAS:RES?

This command queries the currently calculated output resistance determined by the ratio of voltage to current. The value returned is in ohms.

Comparison Measurements

A digital multimeter in combination with a 10 mΩ shunt was used for the reference measurement. A QL20V20C24 was used for comparison.

The QL was operated in current mode with a setting of 10 A.



Resistance type	Reference value ¹ in Ω ²	Interface value in Ω ²	Deviation from reference in % ^{3,4}	Maximum theoretical tolerance in % ^{3,5}
Measuring cable 2 m	0,037389	0,037398	0,02	± 3,04
Power resistor 80 W	0,79240	0,79132	0,14	± 0,55
Power resistance 120 W	1,1746	1,1723	0,20	± 0,51

1) Multimeter: Keysight 34461A Shunt: Burster 1240-0.01 (10 m Ω)

2) Rounded to 5 significant digits.

3) All percentages are rounded to 0.01%.

4) Measurement deviation depends on the measuring points of the device. Each individual device may deliver different results.

5) Only valid for this device type. Consists of current and voltage measurement tolerance.

