Measurements International

Metrology is Our Science, Accuracy is Our Business™

6200A Cryogenic Current Comparator (CCC)

Available for Order

Featuring

- Best Uncertainty of < 3 parts in 10^{-9}
- Resistance Range 0.1 Ω to 1 MΩ
- Maximum Ratio 1000:1
- Helium re-condensing unit for low-loss system
- Front panel or Computer Controlled Operation
- Designed by Dr. Carlos Sanchez

Overview

Introducing the Model 6200A Cryogenic Current Comparator Bridge (CCC) from Measurements International (MI) - the ultimate solution for achieving the highest level of resistance calibration accuracy. With an uncertainty of less than 3 parts in 10-9, our CCC surpasses all other technology on the market.

Since 1987, MI has been a leader in providing the most accurate DCC room temperature resistance bridges, allowing customers to achieve unbeatable accuracy levels. However, with the introduction of the Model 6200A CCC, we are proud to take your resistance calibration capabilities to new heights.

Designed by Dr. Carlos Sanchez, a renowned expert in precision electrical metrology with years of experience in CCC Bridges and Quantum Hall Resistance Standards (QHR), the Model 6200A is the ultimate choice for metrology laboratories. Don't settle for anything less than the best - trust MI to deliver unmatched accuracy and precision. Upgrade to the Model 6200A today.

Feature	Benefit
Measurement Range 0.1 Ω to 1 MΩ	Offers users a wide range of measurements at very low uncertainties.
Re-condensing unit for low-loss Helium	Offers continuous operation without need for liquid Helium supply.
Wide Ratio capabilities for comparison of standard resistors to QHR	$R_K/2$:100 Ω, $R_K/4$:100 Ω, $R_K/2$:1 kΩ and $R_K/2$:10 kΩ

6200A Cryogenic Current Comparator (CCC)

Design

The CCC is designed with a transfer function of less than 8 $\mu A\cdot turn/\varphi_0$ and uses a Quantum Design DC SQUID system with a flux noise level of less than $5\times10^{-6}\ \varphi_0/(Hz)^{1/2}$. These characteristics allow the bridge to achieve a resolution of a few parts in 10^9 in only a few minutes of measurement.

Several ratio windings are provided to allow measurements of standard resistors against the QHR, such as $R_K/2$: 100 Ω, $R_K/4$:100 Ω, $R_K/2$:1 kΩ $R_K/2$:10 kΩ, as well as 1:1, 10:1, 100:1, and 1000:1 ratios between 0.1 Ω and 1 MΩ The ratio errors are made negligibly small by engineering the dimensions of the superconducting shield with a sufficiently long overlap. Additionally, the number of turns of the CCC windings are binary scaled to enable the measures of the ratio errors of all the windings.

The current sources and room-temperature electronics are based on the mature technologies that have been used in MI precision resistance bridges for many years. These include quiet power supplies with very high DC and AC isolation to eliminate leakage and mains-generated noise, optical isolation between sensitive analog electronics and digital control circuitry, low noise, high stability (master-slave) sources with high isolation, close tracking and filtering to allow proper SQUID operation. A very sensitive nanovolt amplifier with a noise spectrum of less than 2 $nV/(Hz)^{1/2}$ is used to detect the difference in the voltage drops across the resistors and feedback signal to correct this imbalance.

Cryogenics of System

The CCC is installed on a probe with superconducting and magnetic shielding and inserted in an almost zero-loss Cyrogenic System. The re-condensing system uses a pulsed tube cryocooler to allow for the initial cooldown of the CCC with two Helium gas cylinders and continuous 24-7 operation.

User Interface

The bridge can be configured and run either from the front panel or under computer control using Windows® based software. The software has many features to allow easy operation and full control and automation of the measurements, such as creating and recalling measurement setting files, programming measurement sequences, and controlling supporting instrumentation. Measurement data is easily exported directly to Excel for further analysis, reporting, and quality system documentation.

Stand Alone Operation

The CCC bridge and software can also be used as a stand-alone system to perform characterization measurements on QHR samples, such as magnetic field sweeps, measurement of contact resistances, and determination of the longitudinal sample voltage (dissipation).

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Specifications: Rev 0

Range (1:1 Ratio)	Accuracy (uΩ/Ω)	Range (1:10 Ratio)	Accuracy (uΩ/Ω)	Range (1:100 Ratio)	Accuracy (uΩ/Ω)
0.1 Ω to 0.1 Ω	0.01	0.1 Ω to 1 Ω	0.01	1 Ω to 100 Ω	0.003
1 Ω to 1 Ω	0.003	1 Ω to 10 Ω	0.003	10 Ω to 1 kΩ	0.003
10 Ω to 10 Ω	0.003	10 Ω to 100 Ω	0.003	100 Ω to 10 kΩ	0.003
100 Ω to 100 Ω	0.003	100 Ω to 1 kΩ	0.003	1 kΩ to 100 kΩ	0.005
1 kΩ to 1 kΩ	0.003	1 kΩ to 10 kΩ	0.003	10 kΩ to 1 MΩ	0.01
10 kΩ to 10 kΩ	0.003	1 kΩ to 13 kΩ	0.003		
100 kΩ to 100 kΩ	0.005	10 kΩ to 100 kΩ	0.005		
1 MΩ to 1 MΩ	0.01	100 kΩ to 1 MΩ	0.01		

**CCC Notes

1. These uncertainties are expressed in μΩ/Ω at k=2.
2. The type B uncertainties of the bridge itself should be below 0.002 μΩ/Ω (k=2). The stated uncertainties include an estimate of the type A uncertainties which are dependent on signal level and measurement time. For typical signal levels (i.e. power dissipation between 1 mW and 10 mW) and measurement time around 15 minutes, the type A uncertainty would be between 0.002 and 0.003 μΩ/Ω (k=2).

Dimensions (L × W × H):
TBD

Weight:
TBD

Shipping Weight:
TBD

Mains Power:
TBD

Corporate Headquarters
Measurements International
PO Box 2359, 118 Commerce Drive
Prescott, Ontario, Canada K0E 1T0

Phone: 613-925-5934
Fax: 613-925-1195
Email: sales@mintl.com

Toll Free: 1-800-324-4988

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