



DC and Low Frequency Services

Calibration of Current Comparator Resistance Bridges

DC current comparator resistance bridges are used in many laboratories for the routine calibration of resistance standards in the range from 0.1 Ω to 10 k Ω . Despite the high intrinsic ratio accuracy of DC current comparators, systematic errors may occur in resistance comparisons, due to the finite gain of the feedback loop, uncompensated offset effects, trim circuit adjustment or leakage effects.

METAS is offering a calibration service which is based on a series of well characterised standard resistors. The 10:1 and 1:1 ratio errors of the bridge under test can be determined with a standard uncertainty in the order of 20 n Ω/Ω .

Procedure

The measurements are performed using three sets of temperature stabilised standards (values from 0.1 Ω to 10 k Ω in decadic steps in each set). The standards are calibrated in terms of the quantised Hall resistance using the METAS cryogenic current comparator. The reference value of the standards is established with an uncertainty below 5 n Ω/Ω .

A linearity check can be carried out for the 100 Ω to 10 Ω ratio using a special 100 Ω standard which can be varied in steps of 10 $\mu\Omega/\Omega$.

Measurement capabilities with uncertainty budget

Device under test	High accuracy resistance bridges (e. g. MI 6010, Guildline 6675)
Measurand	10:1 and 1:1 ratio accuracy, in the range from 0.1 Ω to 10 k Ω Linearity of the 100 Ω to 10 Ω ratio; range: $\pm 50 \mu\Omega/\Omega$ off the nominal value
Expanded uncertainty (k = 2)	20 n Ω/Ω or higher, depending on the short term stability of the device under test
Price	See price list, available at www.metas.ch/db
Turnaround time	Approximately ten days



The **Federal Office of Metrology (METAS)** is the national standards laboratory, it realises and makes available internationally agreed units and standards at the accuracy required. The dc and low frequency team provides facilities for the measurement of electrical quantities from DC up to around 1 MHz. In order to maintain its role at the head of the chain of measurement, the team participates actively in a series of research and development projects as part of the international effort to improve the accuracy of the electrical units realisation and to promote good practice in metrology.

Calibration services in the dc and lf field

- DC resistance from 1 $\mu\Omega$ to 10 P Ω
- DC voltage from 100 μV to 100 kV
- DC current from 10 pA to 10 kA
- AC voltage (ac-dc difference) from 2 mV to 1000 V and 10 Hz to 1 MHz
- AC current from 10 mA to 20 A and 20 Hz to 10 kHz
- Capacitance from 1 pF to 1 μF at 50 Hz to 10 kHz
- Inductance from 1 μH to 10 H at 50 Hz to 10 kHz

In addition, METAS undertakes consultancy work and provides educational seminars on electrical standards and measurement techniques. For further information on our services please see the full service catalogue at www.metas.ch/en/dldb/index.html or contact our staff.

For technical questions, please contact:

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