



Schweizerische Eidgenossenschaft  
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Federal Department of Justice and Police FDJP  
Federal Office of Metrology METAS



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  $\Omega$  to 10 k $\Omega$ . 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 $\Omega/\Omega$ .

### Procedure

The measurements are performed using three sets of temperature stabilised standards (values from 0.1  $\Omega$  to 10 k $\Omega$  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 $\Omega/\Omega$ .

A linearity check can be carried out for the 100  $\Omega$  to 10  $\Omega$  ratio using a special 100  $\Omega$  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, Guidline 6675)
Measurand	10:1 and 1:1 ratio accuracy, in the range from 0.1 $\Omega$ to 10 k $\Omega$ Linearity of the 100 $\Omega$ to 10 $\Omega$ ratio; range: $\pm 50 \mu\Omega/\Omega$ off the nominal value
Expanded uncertainty (k = 2)	20 n $\Omega/\Omega$ or higher, depending on the short term stability of the device under test
Price	See price list, available at <a href="http://www.metas.ch/db">www.metas.ch/db</a>
Turnaround time	Approximately ten days