

Comparison of 1.018 V and 10 V DC Voltage Standards

COOMET.EM.BIPM-K11

Technical protocol for the Bilateral RMO comparison between VNIIM and BELGIM, COOMET Project 530/BY/11

1. Introduction

The Bilateral RMO Comparison will be performed at 1.018 V and 10 V levels to check the coherence of the Josephson Voltage Standards (JVS). The comparison will be performed by measuring a set of two transportable Zener diode-based references (Zeners). There will not be a direct comparison among the JVS. The comparison will take place in the BELGIM' DC laboratory and in VNIIM' DC laboratory planning from July to September 2011.

We consider that this comparison is similar to BIPM.EM-K11.a and BIPM.EM-K11.b

2. Purpose

The purpose of this comparison is to link the voltage reference of BELGIM (Belarussian State Institute for Standardisation and Metrology) to that of the VNIIM (D.I. Mendeleev Institute for Metrology, Russia) in the frame of the COOMET- RMO key comparisons.

3. The standards

The BELGIM's transfer standards to be measured are two Fluke 732B Zeners referred as:

Z1	s/n 8659701
Z2	s/n 8659702

Those Zeners have two output voltages, nominally 1.018 V and 10 V. Within this comparison, both of outputs will be measured.

To select those standards, previous measurements from BELGIM's Zener group were made to select the two standards with lower dispersion in the measurements of 1.018 V and 10 V output voltages.

4. Powering the Zeners

The Zeners will be disconnected from the mains at least two hours before the beginning of the measurements and be reconnected to the mains at most six hours later. If the front panel LOW BAT indicator starts blinking the Zeners must be immediately connected to the mains for recharging of the battery.

When the Zeners are not in the process of measurements, they must be permanently connected to the mains (front panel AC PWR lighted).

5. Measurements schedule

There will be at least four series of measurements performed by VNIIM and at least eight series of measurements performed by BELGIM. The BELGIM start measurements, than Zeners are delivered to VNIIM and than Zeners are delivered to BELGIM to finish measurements. Planned period of the measurements are from July to September 2011.

6. Temperature and pressure coefficients, environment conditions

The temperature, pressure and humidity of the laboratory will be measured in each measurement.

7. Uncertainties

An uncertainty budget will be given containing the different sources of uncertainty and their values.

Foreseen sources of uncertainty: realization of the voltage reference;
detector;
leakage resistance;
no compensated thermal electromotive forces;
and for each Zener: type A uncertainty.

8. Link with other comparisons

VNIIM participated in the BIPM.EM-K11.a and BIPM.EM-K11.b comparisons, and in the BIPM.EM-K10.a and BIPM.EM-K10.b comparisons, this allow us to link our comparison to the BIPM.EM-K11.a and BIPM.EM-K11.b.

9. Participant report

The BELGIM report must be sent to the VNIIM within one month from the completion of his measurements.

This report will contain:

The measurement method description and:

for each reported value:

identification of Zener;
date and time of measurement;
measured voltage;
ambient temperature, humidity, and pressure;
the Type A standard uncertainty;

an uncertainty budget with the different sources of uncertainty and their values, as:

realization of the voltage reference;
detector;
leakage resistance;
no compensated thermal electromotive forces.

10. Final report

The draft version of the final report will be issued within two months after completion of the comparison. It will be sent to BELGIM for discussion and approval. The final report will be then submitted.

11. Contact persons

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