

LEr 05/12/2012

DRAFT TECHNICAL PROTOCOL

1. INTRODUCTION

The comparison is organised within the EU-Indonesia Trade Support Programme II, Sub-project Number APE12-06b, "Improvement of traceability of Metrology and Calibration measurements of Puslit KIM".

The comparison is linked to the corresponding Euromet comparison N° 429.

Two National Metrology Institutes take part in this comparison: LNE (France) and KIM-LIPI (Indonesia).

LNE is acting as the pilot laboratory and in this function is responsible for providing the travelling standard, the evaluation of the measurement results and the final report.

The comparison will be accomplished in accordance with the EURAMET Guidelines on Conducting Comparisons and CCEM Guidelines for Planning, Organising, Conducting and Reporting Key, Supplementary and Pilot Comparisons.

2. PARTICIPANTS AND ORGANIZATION

2.1. The travelling standard is a Zener diode standard Fluke 732A.

2.2. Specifications

Nominal value of the outputs	1V, 1.018 V and 10 V.
Stability per month:	(10V output): ± 0.5 ppm/month
Output impedance:	1M Ω for 10V output, 1k Ω for 1.0V and 1.018 V.
Dimensions of the case:	80 mm x 60 mm x 40 mm
Total mass Approx.:	30 kg

2.3. Powering the standard

If not carrying out measurements on the standards, **the standards must continue to receive uninterrupted voltage from the AC line power** (230 V, 50 Hz). Check that the front panel **AC PWR** indicator lights when the standard is connected to the AC line power.

During measurements, the standard should be operated at its internal battery, i.e., disconnected from the AC line power. If the battery voltage drops low, the front panel LOW BAT indicator starts blinking and the standard must be plugged into the AC line power immediately to allow for recharging of the battery and to avoid extinguishing the IN CAL indicator.

Front panel indicators

- **AC PWR**

The AC PWR indicator lights whenever the standard is connected to AC line power (230 V, 50 Hz).

- **IN CAL**

The IN CAL indicator goes out after excessive drops in battery operating voltage or gross changes in oven temperature.

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If the IN CAL indicator doesn't light, you must immediately contact the pilot laboratory, which will give specific instructions how to proceed.

▪ CHARGE

The CHARGE indicator lights when the standard is connected to the AC line power and the internal battery is in the charging mode. When the battery is near full charge, the CHARGE indicator goes off.

▪ LOW BAT

The LOW BAT indicator blinks when approximately 5 hours of battery operation time remains.

When LOW BAT blinks, plug the standard into the AC line power immediately to avoid extinguishing the IN CAL indicator. The battery is recharged in less than 24 hours with the self-contained automatic battery charger.

3. Quantities to be measured

- $V_{1.018}$: voltage at the output 1.018 V;
- V_{10} : voltage at the output 10 V;
- T_{ext} : the temperature (°C) of the environment where the standard is measured.

4. Measurement instructions

Precautions

- Do not short the output voltages.
- Make sure not to disconnect the standard from the AC line power for too long a period.
- Avoid extreme temperature, humidity or pressure changes as well as violent impacts.

Stabilization of the standards

After arrival in the participant's laboratory, the standards should be allowed to stabilise in a temperature and, possibly, humidity controlled room for at least three days before use. Don't place the standards too close to each other, this to avoid heating of the standards.

Powering of the standard during the measurements

When not carrying out measurements, the standards must be connected continuously to the AC line power.

Measurements should be carried out with the standard operated at its internal battery, i.e., disconnected from the AC line power. To allow the standard for stabilization, battery-operated measurements should not start any sooner than 2 hours after disconnection of the standard from the AC line power. Restrict the disconnection to 6 hours or less.

In addition to the battery-operated measurements, measurements can be made (and submitted to the pilot laboratory) with the standards connected to the AC line power. Notice that connection to the AC line power during measurement will (probably) have consequences for the connection of guard and/or ground.

Guarding

Assuming that you carry out the voltage measurements with the standards disconnected from the AC line power, the front panel GUARD binding post should be connected to the guard of your measuring system and to the front panel CHASSIS binding post. At one point in your system the guard should be connected to ground.

If measuring while the standards are powered by the AC line power, the CHASSIS must be

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disconnected from the GUARD to avoid earth loops.

The measurements should be performed under the following conditions:

- Temperature of the environment: $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$;
- Relative humidity: between 30 % and 70 %.

5. Reporting of results

A report should be sent to the pilot laboratory within one month after the measurements are completed. The report should include:

- Description of the measurement method;
- The reference standard;
- The traceability to the SI;
- The results of the quantities to be measured (list of section 3);
- The associated standard uncertainties, the effective degrees of freedom and the expanded uncertainties;

The environment conditions must also be reported.

6. Uncertainty of measurement

The uncertainty must be calculated following the ISO “Guide to the expression of uncertainty in measurement” (GUM) and the complete uncertainty budget must be reported.

7. Transportation

The travelling standard must be transported in the original case and protected from mechanical loads, vibration etc. for transport by plane.

The travel box contains the following items:

- Zener reference standard,
- Operating instructions of the travelling standard (this document).

8. CONTACT

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