

# The BIPM key comparison database



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## The BIPM key comparison database

The KCDB is a **public-access website**

<http://www.bipm.org/kcdb>

built up upon a number of databases and  
maintained by the BIPM



“The BIPM key comparison database” is a historic term that does not describe its actual content. It is generally known as “The KCDB”.

All the information it contains is  
**internationally reviewed and recognized**  
through the procedures described in the text of the  
CIPM MRA and  
**always kept up to date**

## The CIPM MRA operation

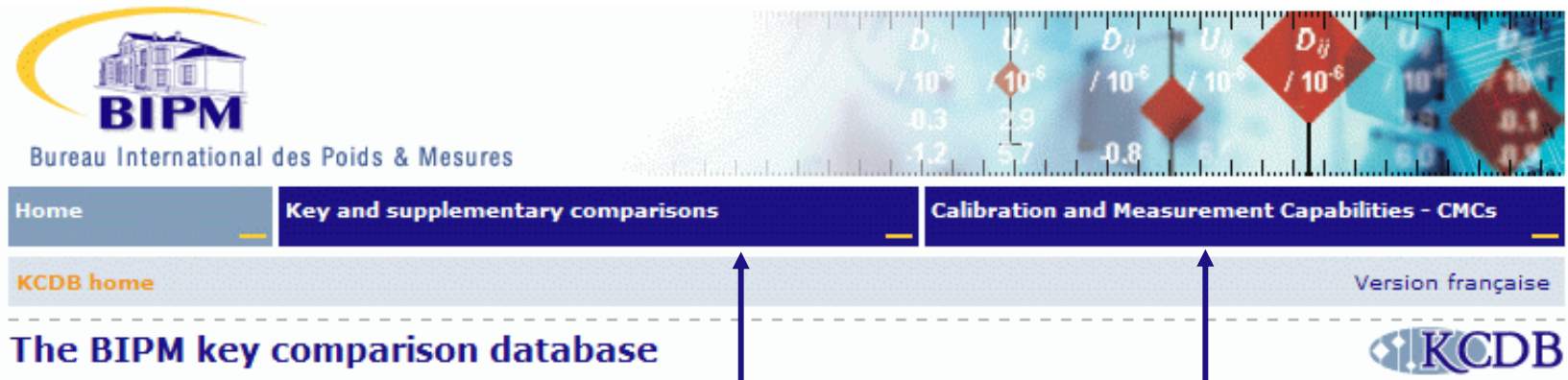
### Participants in the CIPM MRA:

- participate in “**key comparisons**” organized by the CIPM’s Consultative Committees or by the Regional Metrology Organizations, chosen to characterize activities and calibration services in a particular technical area,
- declare the uncertainties associated with their **Calibration and Measurement Capabilities (CMCs)** used in day to day services and have these validated by international experts on the basis of results obtained in key and other international comparisons, and
- have installed an approved Quality System.

Participants in the CIPM MRA: about 210 Metrology Institutes, from about 75 countries all over the world, maintaining national standards and delivering traceability to the SI in their respective countries.

## Data available in the KCDB

- Results of these **key** (and other international) **comparisons**” when they are approved by the appropriate body (CIPM’s Consultative Committees or Regional Metrology Organizations), and
- Lists of **Calibration and Measurement Capabilities (CMCs)** declared by each participant in the CIPM MRA when these have been validated.



**EQUIVALENCE OF NATIONAL STANDARDS**

**ACCEPTANCE OF CERTIFICATES**

## Calibration and Measurement Capabilities - CMCs

### Recognition: the CIPM MRA Logo and Statement

CMCs published in the KCDB are drawn up by the declaring Institute, reviewed and **approved** by international experts from the different Regional Metrology Organizations and **covered by an approved QS** (compliant with ISO/IEC 17025).

Certificates supported by CMCs published in the KCDB are accepted worldwide by all participants at whatever accuracy is stated in the KCDB.



*Under the CIPM MRA, all participating institutes recognize the validity of each other's calibration and measurement certificates for the quantities, ranges and measurement uncertainties specified in the KCDB*

## Key comparisons

### Definition:

A key comparison is one of the set of comparisons **selected by a Consultative Committee (CC) of the CIPM** to test the principal techniques and methods in the field

Results: interpreted in terms of equivalence

**degrees of equivalence** of each participant relative to an agreed reference value (offset + uncertainty) are shown in **graphs of equivalence**

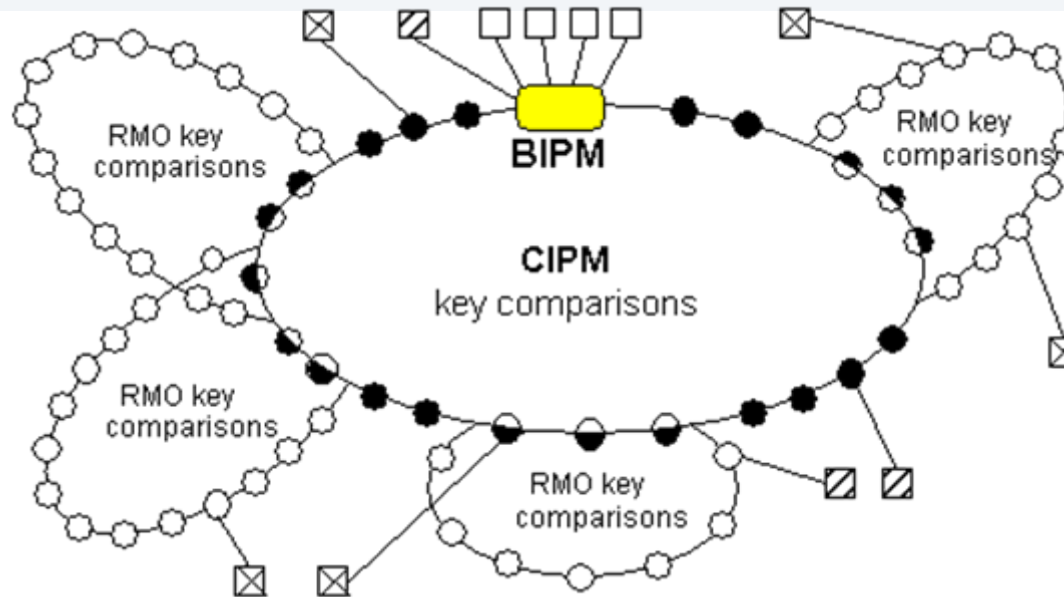


**EQUIVALENCE OF  
NATIONAL  
STANDARDS**

Since 1999, 970 comparisons have been recorded in the KCDB. They cover all Metrology areas.

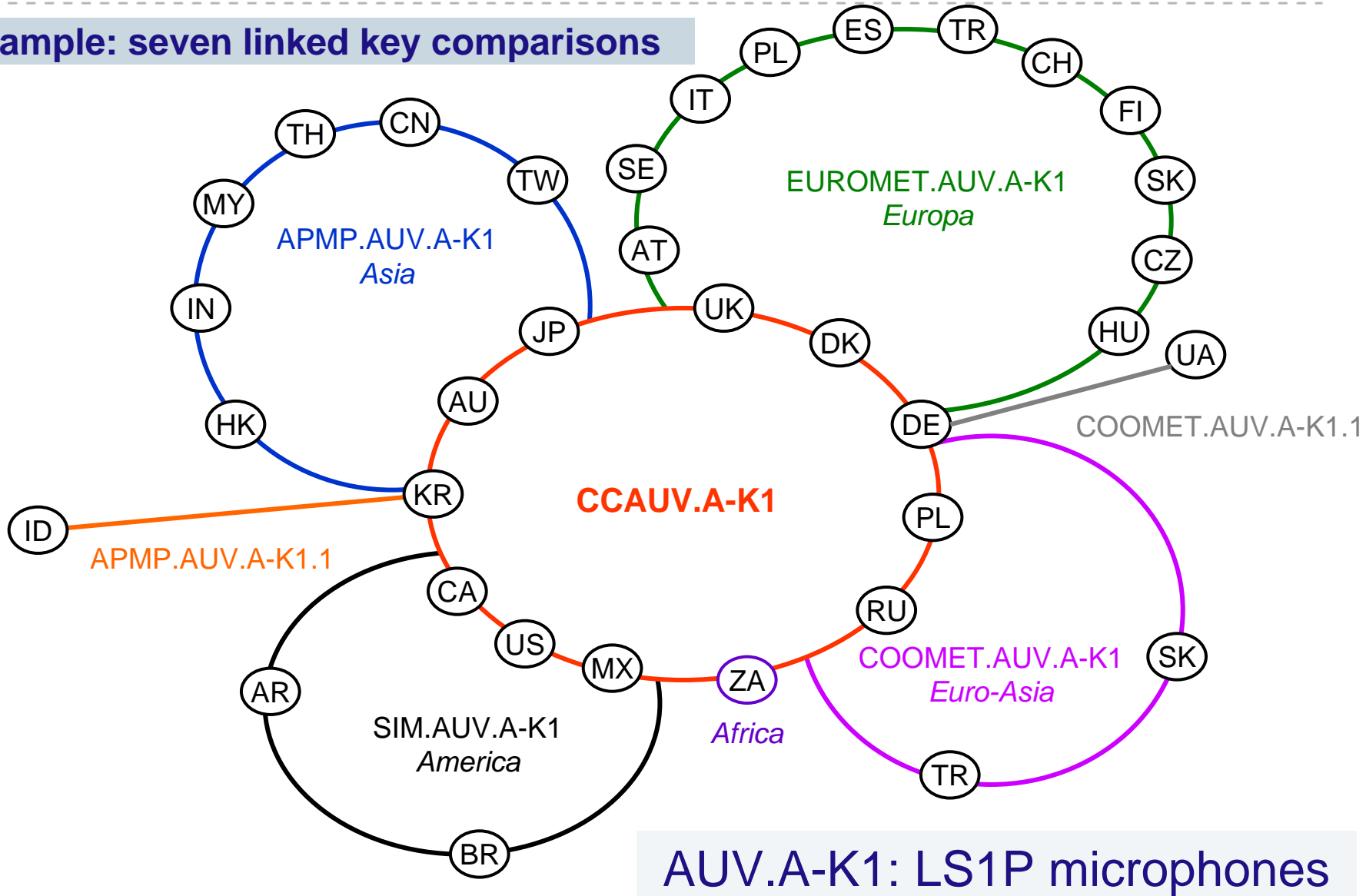
# Key comparisons

## Organization to form families: equivalence and linkage



- Results of key comparisons are interpreted to show equivalence between any one of the participants in any comparison of the family
- Comparison results in the KCDB are publicly available, ensuring the transparency of the whole CIPM MRA process.

**Example: seven linked key comparisons**



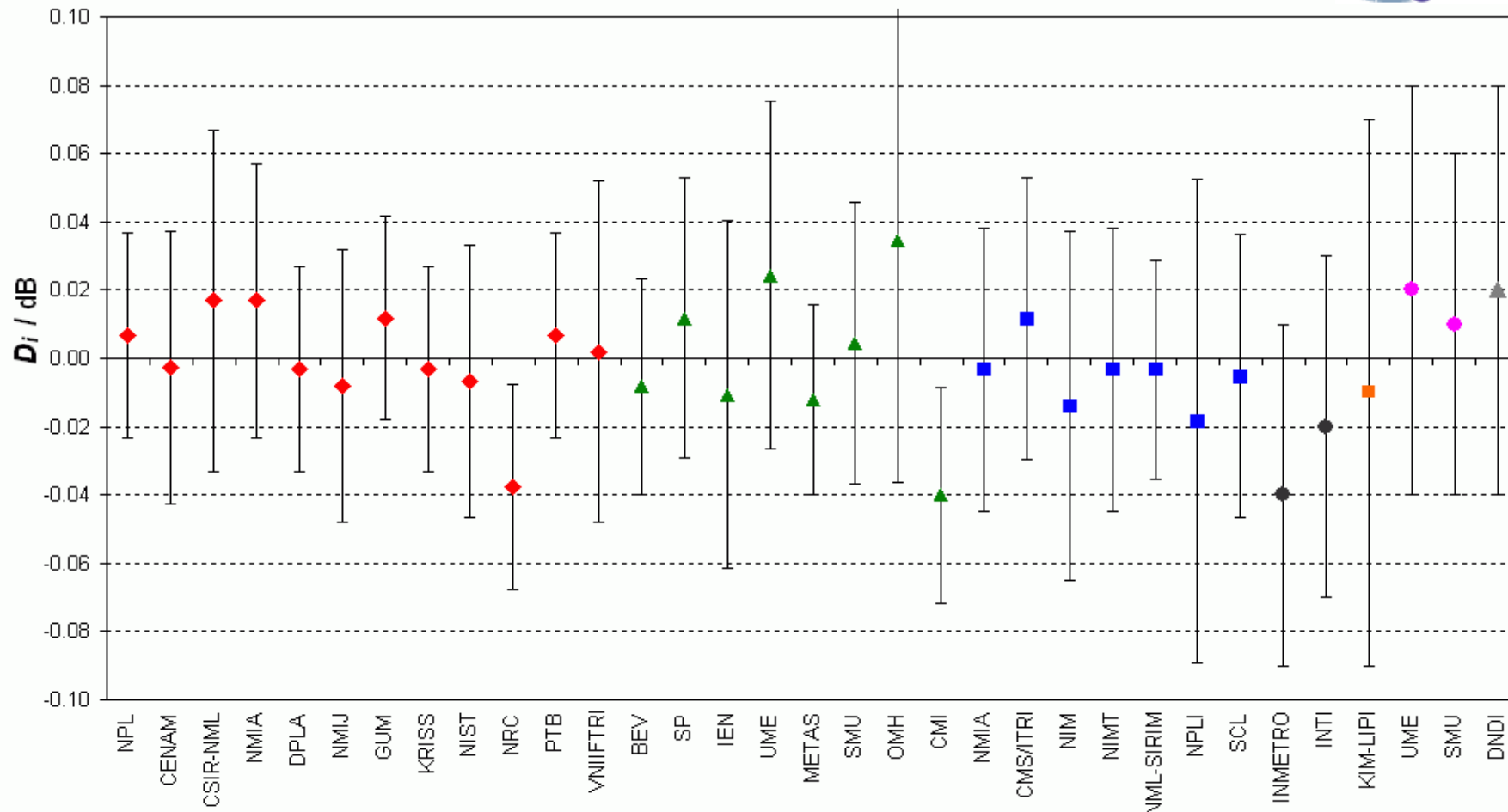
**AUV.A-K1: LS1P microphones**



CCAUV.A-K1, and EUROMET, APMP, and SIM.AUV.A-K1, APMP.AUV.A-K1.1, COOMET.AUV.A-K1, and COOMET.AUV.A-K1.1 - Microphone LS1P, frequency 250 Hz



Degrees of equivalence [ $D_i$ ] and its expanded uncertainty  $U_i$  ( $k = 2$ )



Red diamonds : CCAUV.A-K1 participants

Green triangles : EUROMET.AUV.A-K1 participants only

Blue squares : APMP.AUV.A-K1 participants only

Black circles : SIM.AUV.A-K1 participants only

Orange square : APMP.AUV.A-K1.1 participant only

Pink circles : COOMET.AUV.A-K1 participants only

Grey triangle : COOMET.AUV.A-K1.1 participant only

The KCDB displays two other examples of seven key comparisons linked together: [AUV.V-K1](#) and [M.M-K1](#)



## Key and other international comparisons

After eleven years...

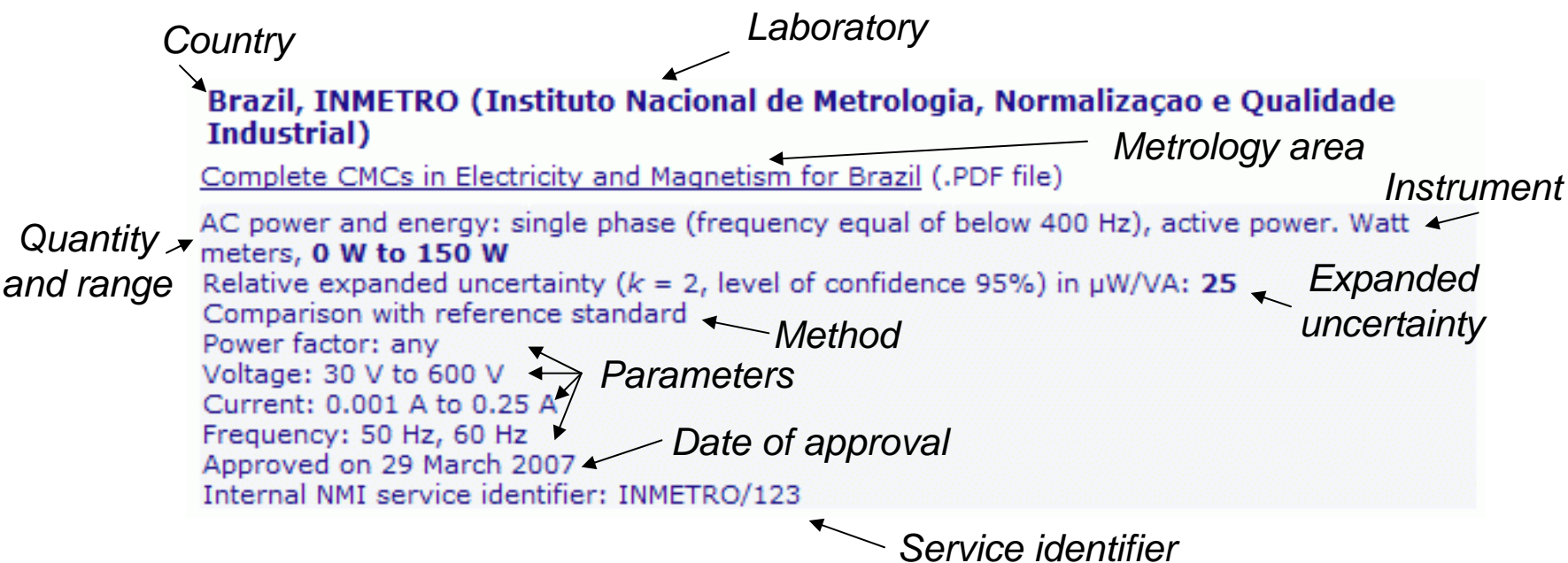
We have observed a clear improvement in the overall quality of international comparisons in metrology.

The KCDB is the preferred place to find results on the comparability of national standards of measurement and thus get information on their equivalence.

## Calibration and Measurement Capabilities - CMCs

### Presentation of CMCs information in the KCDB

The CMCs information are made available in the KCDB in **open access**, under the form of **pdf files** and **html pages** returned by the web after a query has been made using one of the proposed search engines.



More than 23 200 CMCs are currently published in the KCDB

## Search engines for CMCs in the KCDB

### Calibration and Measurement Capabilities - CMCs

#### What's new about CMCs ?

- [Photometry and Radiometry - Japan](#)  
09 June 2009
- [Length - Hong Kong, China](#)  
08 June 2009
- [All news](#)

→ Choose your search engine to access CMCs information

#### Free search

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#### Metrology area

- [AUV](#)
- [EM](#)
- [L](#)
- [M](#)
- [PR](#)
- [QM](#)
- [RI](#)
- [I](#)
- [TF](#)

#### Advanced search

Select a Metrology Area

→ Search

#### List of Metrology Areas

Acoustics, Ultrasound, Vibration (AUV)

Electricity and Magnetism (EM)

## Search for specific CMCs in the KCDB

### Calibration and Measurement Capabilities - CMCs



#### What's new about CMCs ?

- [Photometry and Radiometry - Japan](#)  
09 June 2009
- [Length - Hong Kong, China](#)  
08 June 2009
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→ Choose your search engine to access CMCs information

#### Free search

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#### Metrology area

- [AUV](#)
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#### Advanced search

Select a Metrology Area

→ Search

#### List of Metrology Areas

Acoustics, Ultrasound, Vibration (AUV)

Electricity and Magnetism (EM)

## Refine your search

### CMC AREA

CMCs General Physics (58)

### PHYSICS

Sound in air (58)

Pressure sensitivity level (58)

### GEOGRAPHIC LOCATION

- APMP (16)
  - Malaysia (6)
  - Japan (4)
  - Korea, Republic of (4)
  - Australia (1)
  - Chinese TAIPEI (1)
- EURAMET (15)
  - France (8)
  - Austria (3)
  - Bulgaria (3)
  - Czech Republic (1)
- COOMET (12)
  - Russian Federation (12)
- SIM (11)
  - Canada (5)
  - Argentina (3)
  - Brazil (3)
- AFRIMETS (4)
  - South Africa (4)

## Result of the search

Your query 'Pressure sensitivity level LS1P microphone ' produced 58 results

[New search](#)

1 2 3

### Czech Republic, CMI (Czech Metrology Institute)

[Complete CMCs in Acoustics, Ultrasound, Vibration for Czech Republic \(.PDF file\)](#)

Pressure sensitivity level. Measurement microphone type LS1P, **-24 dB (reference: 1V/Pa) to -28 dB (reference: 1V/Pa)**

Absolute expanded uncertainty ( $k = 2$ , level of confidence 95%) in dB: **0.05**

IEC 61094-2:1992

Frequency: 63 Hz to 1.0 kHz

### Argentina, INTI (Instituto Nacional de Tecnologia Industrial)

[Complete CMCs in Acoustics, Ultrasound, Vibration for Argentina \(.PDF file\)](#)

Pressure sensitivity level. LS1P microphone. Measurand unit, **dB (reference: 1 V/Pa)**

Absolute expanded uncertainty ( $k = 2$ , level of confidence 95%) in dB: **0.05**

Pressure sensitivity level by reciprocity IEC 61094-2

Frequency: 63 Hz to 2 kHz

Internal NMI service identifier: INTI/02.01E.03.002

Pressure sensitivity level. LS1P microphone. Measurand unit, **dB (reference: 1 V/Pa)**

Absolute expanded uncertainty ( $k = 2$ , level of confidence 95%) in dB: **0.1**

Pressure sensitivity level by reciprocity IEC 61094-3

Frequency: 4 kHz to 8 kHz

Internal NMI service identifier: INTI/02.01E.03.002

Pressure sensitivity level. LS1P microphone. Measurand unit, **dB (reference: 1 V/Pa)**

Absolute expanded uncertainty ( $k = 2$ , level of confidence 95%) in dB: **0.2**

Pressure sensitivity level by comparison

Frequency: 63 Hz to 8 kHz



## Refine my search

The BIPM key comparison database



Refine your search

CMC AREA

CMCs General Physics (3)

PHYSICS

Sound in air (3)

GEOGRAPHIC LOCATION

EURAMET (3)  
Austria (3)

Result of the search

Your query 'Pressure sensitivity level LS1P microphone ' produced 3 results

[New search](#)

**Austria, BEV (Bundesamt für Eich- und Vermessungswesen)**

[Complete CMCs in Acoustics, Ultrasound, Vibration for Austria \(.PDF file\)](#)

Pressure sensitivity level. Measurement microphone type LS1P. Measurand unit, **dB**  
**(reference: 1 V/Pa)**  
Absolute expanded uncertainty ( $k = 2$ , level of confidence 95%) in dB: **0.05**  
IEC 601094-2: 1992  
Frequency: 63 Hz to 4 kHz

Pressure sensitivity level. Measurement microphone type LS1P. Measurand unit, **dB**  
**(reference: 1 V/Pa)**  
Absolute expanded uncertainty ( $k = 2$ , level of confidence 95%) in dB: **0.07**  
IEC 601094-2: 1992  
Frequency: 5 kHz to 8 kHz

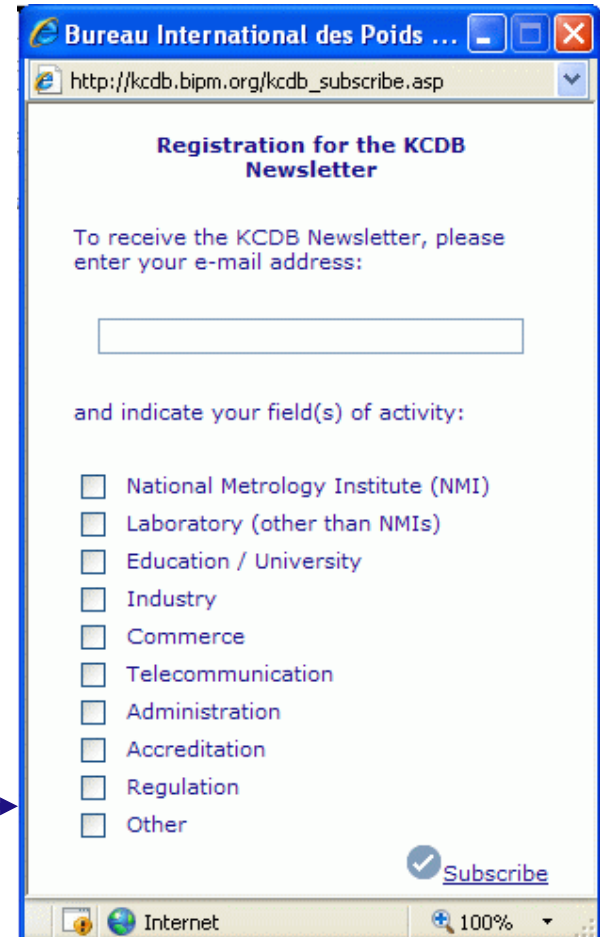
Pressure sensitivity level. Measurement microphone type LS1P. Measurand unit, **dB**  
**(reference: 1 V/Pa)**  
Absolute expanded uncertainty ( $k = 2$ , level of confidence 95%) in dB: **0.09**  
IEC 601094-2: 1992  
Frequency: 10 kHz

## Conclusions

After eleven years of implementation ....

The KCDB is a unique tool that serves as the ultimate reference for all actors in metrology and for users in the regulatory, accreditation, and industrial sectors

*Subscribe for our  
KCDB Newsletter*



The screenshot shows a web browser window titled "Bureau International des Poids ...". The address bar contains "http://kcdb.bipm.org/kcdb\_subscribe.asp". The page content is titled "Registration for the KCDB Newsletter". It asks the user to enter their email address in a text box. Below this, it asks the user to indicate their field(s) of activity with a list of checkboxes: National Metrology Institute (NMI), Laboratory (other than NMIs), Education / University, Industry, Commerce, Telecommunication, Administration, Accreditation, Regulation, and Other. A "Subscribe" button with a checkmark icon is at the bottom right. The browser's status bar shows "Internet" and "100%" zoom.