E+E Elektronik Ges.m.b.H

STATEMENT FROM E+E ELEKTRONIK CONCERNING THE TRACEABILITY OF CALIBRATIONS

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Preface

Calibrations that are precise and which can be traced back to international standards are becoming increasingly important in all industry sectors. Among other things, this includes providing conclusive and formal evidence of the accuracy of the measuring facilities used in order to meet the relevant requirements of standard specifications and other regulations.

Many different inspections, appraisals, audits and assessments consider this topic from various points of view in all possible sectors of industrial production and the associated services. Depending on the quantities to be measured and on the sector, different issues are encountered, which sometimes require extended discussions and explanations.

For many years, E+E Elektronik GmbH has provided measuring technology for humidity, dew point, temperature, airflow and the amount of substance fraction CO_2 at the highest international level and with a recognized reputation.

This white paper is intended to provide interested professionals in all relevant industrial and service sectors with an overview of the relationship between traceable calibrations and international measuring technology in the simplest way possible.

1. Traceability of Calibrations

1.1 International Laboratory Accreditation Cooperation (ILAC)

The international harmonized fundamentals for the traceability of calibrations are can be found in the International Laboratory Accreditation Cooperation (ILAC); in the ILAC-Document P10:01/2013 ”ILAC Policy on Traceability of Measurement Results”.

PREAMBLE

To ensure confidence in the results of accredited bodies in the ILAC framework, Accreditation Bodies implement ILAC policies and use guidance documents to assist in the uniform and harmonised approach of accreditation criteria. Metrological traceability of measurement results is a key topic for which a harmonised policy is needed if the market is to have confidence in any accredited service provided by an organization covered by the ILAC Arrangement.
Metrological traceability requires an unbroken chain of calibrations to stated references, all having stated uncertainties – refer VIM [1]. The persistent misconception that metrological traceability may be linked to a particular organization (e.g., “traceable to a specific National Metrology Institute”) fosters continued confusion with regard to its nature. Metrological traceability pertains to reference quantity values of measurement standards and measurement results, not the organization providing them.

Factors that influence the establishment of a harmonised ILAC policy on metrological traceability of measurement results include the following:

(a) The awareness of the relevance of metrological traceability of measurement results is continuously growing and supporting more areas.;

(b) Not all economies have easy access to a complete range of national measurement standards or calibration and measurement capabilities needed to support the calibration and testing needs of all applicants for accreditation in their economy ;

(c) The role of reliable and traceable certified reference materials in providing metrological traceability of measurement results has not yet been fully established internationally;

(d) The availability of metrological traceability chains alternative to SI units when it is not possible to trace measurement results to those units

As the Preamble of the document states, there are metrological fields in which this harmonization is still under development, such as chemistry, medicine, biology and pharmaceutics. Hence, in these fields, this harmonized form of traceability has not yet been achieved.

Until this has been achieved, alternative regulations will be utilized in these areas such as the traceability chain via precise identification of the reference equipment utilized in the calibration.

Of course, this solution has its limits where, on account of the type or level of accuracy of the calibration, a simple reference to the reference equipment utilized is no longer possible.

1.2 Implementation of the Requirement from ISO/IEC 17025

In E+E Elektronik GmbH' accredited calibration laboratory, all ILAC-harmonization have been established in accord with the requirements laid out in P10:07/2021. Hence, there is no doubt as to the traceability of the calibration certificates issued.

The policy for implementation of the requirement from the ISO/IEC 17025 is to be found under Point 2 in the P10:07/2020 "ILAC Policy on Traceability of Measurement Results":

> ***2. ILAC POLICY FOR TRACEABILITY COVERED BY THE ILAC ARRANGEMENT IN CALIBRATION***
>
> ***1) An NMI** whose service is suitable for the intended need and is covered by the CIPM MRA. Services covered by the CIPM MRA can be viewed in the BIPM KCDB which includes CMCs for each listed services. (...)*
>
> *or*
>
> ***2) An accredited calibration laboratory** whose service is suitable for the intended need (i.e, the scope of accreditation specifically covers the appropriate calibration) and the Accreditation Body is covered by the ILAC Arrangement or by Regional Arrangements recognised by ILAC. (...)*
>
> *Appendix A: Appropriate evidence for the technical competence of the calibration service supplier and claimed metrological traceability is likely to include but not be restricted to the following: (numbers refer to clauses in ISO/IEC17025:2017):*
> - *Records of calibration method validation (7.2.2.4)*
> - *Procedures for evaluation of measurement uncertainty (7.6)*
> - *Documentation and records for metrological traceability of measurement results (6.5)*
> - *Documentation and records for ensuring the validity of results (7.7)*
> - *Documentation and records for competence of personnel (6.2)*
> - *Records for equipment which can influence laboratory activities (6.4)*
> - *Documentation and records for facilities and environmental conditions (6.3)*
> - *Audits of the calibration laboratory (6.6 and 8.8)*
>
> *For non-accredited calibration service suppliers it should be noted that it may be necessary to perform a practical assessment of the calibration supplier used, similar to that which would be undertaken by an Accreditation Body against the standard ISO/IEC 17025:2017, to ensure that competent work is actually being performed.*

1.3 Documented Traceability

The calibration certificate template issued by Akkreditierung Austria in the context of accreditation documents this traceability of E+E Elektronik GmbH's accredited metrological quantities with the following text:

> Dieser Kalibrierschein dokumentiert die Rückführbarkeit auf nationale Normale zur Darstellung der physikalischen Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).
>
> Akkreditierung Austria ist Unterzeichner der multilateralen Übereinkommen der European Cooperation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.
>
> *This calibration certificate documents the traceability to national standards, which realize the physical units of measurements according to the International system of Units (SI).*
>
> *Akkreditierung Austria is a signatory to the multilateral agreements of the European Cooperation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates.*

All international harmonized and valid requirements for traceability of the calibration are therewith completely met by the E+E calibration laboratory.

1.4 Worldwide Recognition of the ILAC-Rules

Recognition of the ILAC-Rules exists practically worldwide; nearly all existing national accreditation authorities are signatories to the associated Mutual Agreements (ILAC MRA) *https://www.ilac.org/documents/Signatories_to_the_ILAC_Arrangement.pdf* such as, for example

- **Austria**
  - Akkreditierung Austria
- **Brazil**
  - Coordenação Geral de Acreditação General Coordination for Accreditation (CGCRE)
- **Australia**
  - National Association of Testing Authorities, Australia (NATA)
- **Canada**
  - Standards Council of Canada (SCC)
- **People's Republic of China**
  - China National Accreditation Service for Conformity Assessment (CNAS)
- **France**
  - Comite Francais d'Accreditation (COFRAC)
- **Germany**
  - Deutsche Akkreditierungsstelle GmbH (DAkkS)
- **India**
  - National Accreditation Board for Testing and Calibration Laboratories India (NABL)
- **Italy**
  - L'Ente Italiano di Accreditamento (ACCREDIA)
- **Japan**
  - Japan Accreditation Board (JAB)
  - International Accreditation Japan (IAJapan)
- **Korea**
  - Korea Laboratory Accreditation Scheme (KOLAS)
- **The Netherlands**
  - Dutch Accreditation Council (RvA)
- **New Zealand**
  - International Accreditation New Zealand (IANZ)
- **Sweden**
  - Swedish Board for Accreditation and Conformity Assessment (SWEDAC)
- **Switzerland**
  - Swiss Accreditation Service (SAS)
- **United Kingdom**
  - United Kingdom Accreditation Service (UKAS)
- **USA**
  - American Association for Laboratory Accreditation (A2LA)
  - National Voluntary Laboratory Accreditation Program (NVLAP)
  - International Accreditation Service, Inc (IAS)
  - ANSI-ASQ National Accreditation Board
  - Accreditation Services Bureau (A-S-B) dba Laboratory Accreditation Bureau (L-A-B)
  - Perry Johnson Laboratory Accreditation, Inc (PJLA)

1.5 Worldwide Recognition of the BIPM regulations

In addition, the E+E Elektronik GmbH calibration laboratory has been commissioned by the Republic of Austria to act as the National Metrological Institute (NMI-DI) for the metrological fields of air humidity, airflow and the amount of substance fraction CO_2, and works in the framework of the Mutual Agreements (CIPM-MRA) of the Bureau International des Poids et Mesures (BIPM) at the head of the International System of Units (SI).*http://www.bipm.org/utils/en/pdf/mra_2003.pdf*

Likewise, the BIPM regulations are recognized practically worldwide; signatories of the associated Mutual Agreements (CIPM- MRA) include nearly all of the national metrological institutes with their designated institutes *http://www.bipm.org/en/cipm-mra/participation/signatories.html* such as, for example,

- BEV (Austria) + **E+E Elektronik GmbH**, EAA
- NMIA (Australia) + ANSTO, ARPANSA
- INMETRO (Brazil) + LNMRI/IRD, ON/DSHO
- NRC (Canada) + TCC
- NIM (China) + HAARI
- LNE (France) + LNE-INM/Cnam, LNE-CETIATE, among others
- PTB (Germany) + BAM, BVL, UBA
- NPLI (India) + BARC
- INRIM (Italy) + ENEA/INMRI
- NMIJ AIST (Japan) + CERI, JEMIC, NICT
- VSL (Netherlands)
- MSL (New Zealand)
- KRISS (Korea)
- CEM (Spain) + CIEMAT, INTA, IO-CSIC, u.a.m.
- SP (Sweden) + SSM
- METAS (Switzerland) + IRA, PMOD/WRC, Roth+Co.AG
- NPL (United Kingdom) + LGC, NGML, NMO, TUVNEL
- NIST (USA) + CANNON

2. Authors

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3. Company Profile

E+E Elektronik GmbH with headquarters in Engerwitzdorf/Austria is a company in the Dr. Johannes Heidenhain GmbH group. Employing about 250 people, the company develops and produces sensors and measuring transducers for relative humidity, CO2, airflow velocity and flow rates as well as humidity calibration systems. The main areas of application for E+E products are building services engineering, industrial measurement systems and the automotive industry. The export ratio of about 97 % is achieved via E+E branch offices in China, Germany, France, Italy, Korea and the USA as well as an international distributor network. In addition, E+E Elektronik operates a state-accredited calibration laboratory and has been commissioned by the Bundesamt für Eich- und Vermessungswesen (BEV) (Austrian Federal Office of Metrology and Surveying) with the provision of national standards for humidity, airflow velocity and the amount of substance fraction CO_2.

4. Contact

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