Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
Nationales Metrologieinstitut

Calibration Guidelines, Expert Reports, Technical Reports

Acoustics, Ultrasound and Vibration

Reference	Title	Title (original)	Available in
DKD-R 3-1	Calibration of accelerometers according to the comparison method	Kalibrieren von Beschleunigungsmessgeräten nach dem Vergleichsverfahren	
	Sheet 1: Fundamentals	Blatt 1: Grundlagen https://doi.org/10.7795/550.20190502A	de
	Sheet 2: Shock excitation	Blatt 2: Stoßanregung https://doi.org/10.7795/550.20190502B	de
	Sheet 3: Sine and multi-sinus excitation	Blatt 3: Sinus- und Multisinus-Anregung https://doi.org/10.7795/550.20200527	de
	Sheet 4: Primary calibration of vibration meters with sinusoidal excitation and interferometric measurement of the vibration magnitude	Blatt 4: Primärkalibrierung von Schwingungsmessgeräten mit sinusförmiger Anregung und interferometrischer Messung der Schwingungsgröße https://doi.org/10.7795/550.20180823E	de
DKD-R 3-2	Calibration of conditioning amplifiers for dynamic application https://doi.org/10.7795/550.20190425EN	Kalibrierung von Messverstärkern für dynamische Anwendungen https://doi.org/10.7795/550.20190425	de, en, es
DKD-R 3-13 Sheet 1	Calibration of angular velocity measuring devices Quasi-static calibration https://doi.org/10.7795/550.20250305	Kalibrierung von Winkelgeschwindigkeitsmessgeräten Quasistatische Kalibrierung https://doi.org/10.7795/550.20240301	 de, en

Calibration Guidelines:
DKD calibration guidelines (DKD-R) are application documents that meet the requirements of DIN EN ISO/IEC 17025. The guidelines contain a description of technical, process-related and organizational procedures used by accredited calibration laboratories as a model for defining internal processes and regulations. DKD guidelines may become an essential component of the quality management manuals of calibration laboratories. The implementation of the guidelines promotes equal treatment of the equipment to be calibrated in the various calibration laboratories and improves the continuity and verifiability of the work of the calibration laboratories. In addition, the implementation of the guidelines allows the state of the art in the respective field to be incorporated into laboratory practice.

Download of DKD documents: https://www.ptb.de/cms/nc/en/metrological-services/dkd/publications.html

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Annex – Abstracts

DKD-R 3-1	**Calibration of accelerometers according to the comparison method**
Sheet 1	**Fundamentals** This guideline applies to accelerometers with seismic transducers. It also applies to accelerometers alone as well as to seismic transducers and measuring devices for the translational motion quantities velocity and displacement and the rotational motion quantities angular acceleration, angular velocity, and angle of rotation. The guideline serves as supplement to the international standard ISO 16063-1.
Sheet 2	**Shock excitation** This guideline focuses on calibration procedures that use a hammer-anvil system to generate shock acceleration for accelerometers with seismic transducers. A seismic transducer contains a mass connected to a housing. The movement of the mass due to the applied acceleration is translated into an electrical signal. A sufficiently high resonant frequency is a prerequisite for shock calibration. If the frequency behaviour is unknown, a frequency response test should be carried out prior to calibration. This guideline complements ISO 16063-22 providing instructions regarding the use of calibration equipment and outlines essential procedures and requirements for effectively calibrating accelerometers using shock excitation methods.
Sheet 3	Sine and multi-sinus excitation This guideline refers to calibration procedures in which a sine or multi-sine excitation is generated by a vibration exciter, preferably an electrodynamic one. It applies to the calibration of vibration transducers and the calibration of vibration measuring instruments having an indication of their own. In the broadest sense, vibration transducers convert one of the kinematic quantities “vibration acceleration”, “vibration velocity” or “vibration displacement” into an electrical signal. Irrespective of whether the vibration transducer supplies a signal proportional to the vibration acceleration, vibration velocity or vibration displacement, the physical quantity acceleration is treated as a measured quantity in this guideline.
Sheet 4	**Primary calibration of vibration meters with sinusoidal excitation and interferometric measurement of the vibration magnitude** This guideline refers to primary calibration methods according to ISO 16063-11 in which a sine excitation is generated by means of an exciter, preferably electrodynamic, and the vibration quantity is measured interferometrically according to method 3 (sine approximation). It applies to the calibration of vibration transducers, vibration measuring devices and vibration calibrators; laser vibrometers are considered vibration transducers in this guideline.
DKD-R 3-2	**Calibration of conditioning amplifiers for dynamic application** Sensors used for measuring variables like acceleration, angular velocity (rotation rate), force, torque or pressure are extended by a conditioning amplifier to be connected to data logging and/or display systems. In combination with this amplifier, the sensor forms a measuring chain. To ensure the exchangeability of the components of this measuring chain, sensor and amplifier are to be characterised individually. This guideline describes validated methods to characterize these amplifiers for dynamic measurements, focusing on the complex transfer function related to frequency. Within this guideline, the amplifier to be calibrated is assumed to be linear.

DKD-R 3-13 Sheet 1	**Calibration of angular velocity measuring devices** **Quasi-static calibration** The guideline deals with calibration methods that can be used to calibrate angular velocity measuring devices (with analogue and digital output signals). The present document (Sheet 1) refers to static or quasi-static calibration methods. By using static calibration methods, it is possible to provide information regarding the quality of the linearity of the angular velocity measuring device; however, these methods do not offer the possibility to make a statement about the dynamic transmission behaviour of the measuring devices. The determination of other characteristics such as temperature influence, cross-sensitivities, etc. are not dealt with in this guideline.