SPEKTRA Vibration and Acoustics Systems Engineering

Calibration Systems · Special Equipment · DAkkS Laboratory · Environmental Simulation

akkreditiert durch die / *accredited by the*

Deutsche Akkreditierungsstelle GmbH

DAkkS Deutsche Akkreditierungsstelle D-K-15183-01-00

als Kalibrierlaboratorium im / *as calibration laboratory in the*

Deutschen Kalibrierdienst DKD

Kalibrierschein
Calibration Certificate

Kalibrierzeichen / *Calibration mark*: 3769 | D-K-15183-01-00 | 2017-07

Gegenstand *Object*	**Measurement chain** **Accelerometer ~ Vibration Meter**
Hersteller *Manufacturer*	**RION**
Typ *Type*	**PV-57I ~ VA-12**
Fabrikat/Serien-Nr. *Serial number*	CONFIDENTIAL
Auftraggeber *Customer*	CONFIDENTIAL
Auftragsnummer *Order No.*	CONFIDENTIAL
Anzahl der Seiten des Kalibrierscheines *Number of pages of the certificate*	4
Datum der Kalibrierung *Date of calibration*	**19/07/2017**

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).
Die DAkkS ist Unterzeichner der multi-lateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.
Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.
This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI).
The DAkkS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates.
The user is obliged to have the object recalibrated at appropriate intervals.

Datum *Date*	Leiter des Kalibrierlaboratoriums *Head of the calibration laboratory*	Bearbeiter *Person in charge*
20/07/2017	Philipp Begoff	Uwe Zettl

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1. Object of Calibration

Object:	**Accelerometer**	**Vibration Meter**
Manufacturer:	**RION**	**RION**
Type:	**PV-57I**	**VA-12**
Serial number:	CONFIDENTIAL	CONFIDENTIAL

2. Calibration Method

Calibration was performed using the method of comparison according to Directive DAkkS-R 3-1.
The transducer was exposed to sinusoidal acceleration which was applied by means of an electrody-namic vibration exciter. The measurement chain was calibrated by comparing the display of the object of calibration with that of a reference measuring device.

3. Environmental Conditions

Environmental temperature of the test object:	**(23.0 ± 1) °C**
Relative humidity:	**(53 ± 5) %**

4. Test Conditions

Position of exciting axis (axes) relative to the earth gravity:	**vertical**
Temperature of test object:	**(23.0 ± 2) °C**
Attachment of test object to vibration exciter:	**screwing adapter (M6 to 1/4-28)**
Tightening torque:	**2 N m**
Technical data of the connecting cable	
Manufacturer:	**RION**
Type:	**VP 51KI**
Power supply:	**Akku**
Specification of excitation	
System calibration	
Frequency:	**159.15 Hz**
Acceleration (rms):	**20 m/s²**
for determination of the amplitude-frequency response	
Frequency range:	**5 Hz to 5 kHz**
Acceleration (rms):	**see table 7.2**
Number of frequency points:	**11**
Switch position on the object of calibration	
Menu -> Menu List -> Display	
VM Scale:	**Linear**
Menu -> Menu List -> Analog Input	
High- / Low-pass Filter:	**3 Hz / 20 kHz**
Sensor Selection:	**PV-57I**
Sensitivity:	**475 x 0.01 mV/(m/s²)** (see 7.1!)
Measurement parameter items	
Measurement data type:	**ACC**
Analysis function:	**VM**
Input range:	**10 m/s² or 31.6 m/s²**

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5. Measurement Uncertainty

These are the total relative measurement uncertainties at provided values:

- for determination of the deviation of display at 159.15 Hz			1.5%
- for determination of the deviation of displayed values within the frequency range			
	5 Hz to	<10 Hz	2.5%
	10 Hz to	<20 Hz	2%
	20 Hz to	1000 Hz	1.5%
	>1000 Hz to	5000 Hz	2%

The specified values are the extended measurement uncertainties obtained by multiplying the standard measurement uncertainties by extension factor k = 2. They were ascertained in line with DAkkS-DKD-3. The values of the measuring quantity fall into the assigned intervals with a probability of 95 %.

The Deutsche Akkreditierungsstelle GmbH is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates. The other signatories inside and beyond Europe can be taken from the web pages of EA (www.european-accreditation.org) and ILAC (www.ilac.org).

6. Components of the Reference Measuring Equipment

	Manufacturer	Type	Serial number
Vibration exciter	SPEKTRA	SE-10	050
Ref. standard transducer	PCB	M353B17	LW165928
Calibration system	SPEKTRA	CS18 DKD 10	201414

7. Results

7.1 Deviation of displayed value (Measurement range)

Frequency: **159.15 Hz**
Acceleration (rms): **20 m/s²**

Displayed value before adjustment: **19.9 m/s²**
Sensitivity before adjustment: **475 x 0.01 mV/(m/s²)**
Deviation from nominal value: **-0.50%** (→ sensitivity-adjustment is not necessary)

Measurement range			Nominal value	Displayed value	Deviation from nominal value, %
ACC	m/s²	RMS	20.02 m/s²	19.9 m/s²	-0.6
		PEAK	28.31 m/s²	28.2 m/s²	-0.4
VEL	mm/s	RMS	20.02 mm/s	19.9 mm/s	-0.6
DISP	mm	EQP-P	0.0566 mm	0.056 mm	-1.1

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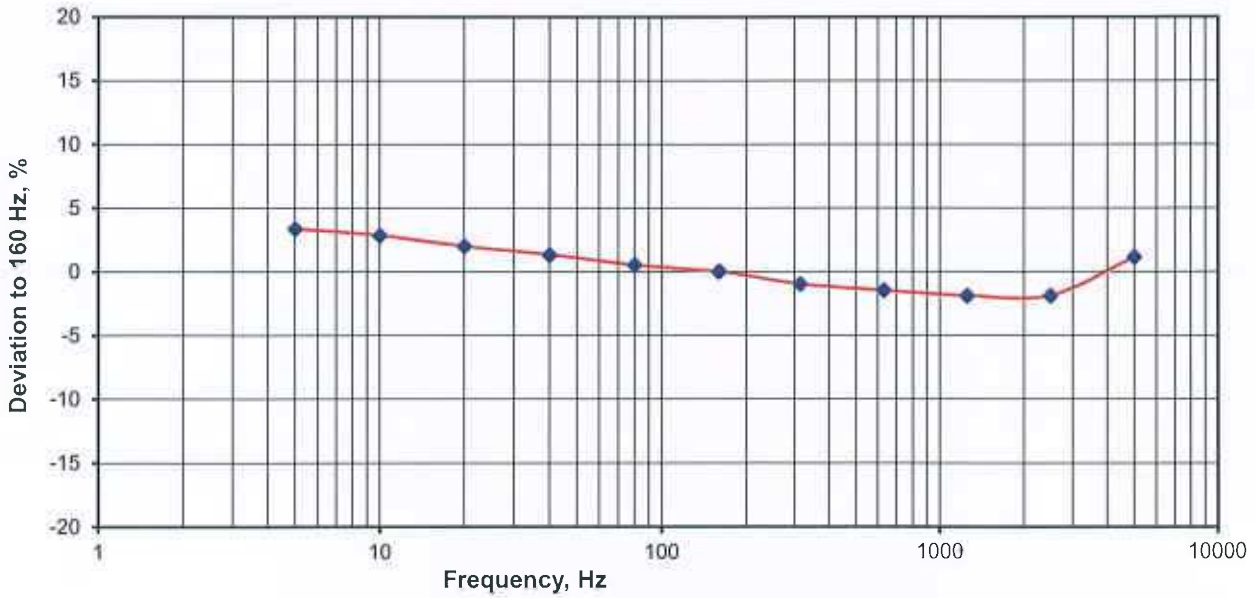
7.2 Deviation of displayed value (absolute and frequency response relative to 160 Hz)

Frequency, Hz	Nominal value, m/s² (rms)	Displayed value,*) m/s² (rms)	Deviation from nominal value, %	dB	Frequ.response relat. to 160 Hz, %
5	1.01	1.04	2.8	0.2	3.4
10	5.05	5.16	2.3	0.2	2.8
20	19.5	19.8	1.4	0.1	2.0
40	20.1	20.2	0.7	0.1	1.3
80	20.0	20.0	-0.1	0.0	0.5
159.15	20.0	19.9	-0.6	-0.1	0.0
160	**20.0**	**19.9**	**-0.6**	**0**	**0**
315	20.0	19.7	-1.6	-0.1	-1.0
630	20.0	19.6	-2.1	-0.2	-1.5
1250	20.0	19.5	-2.5	-0.2	-1.9
2500	20.0	19.5	-2.5	-0.2	-1.9
5000	20.0	20.1	0.5	0.0	1.1

Note: *) ...The mean value from 12 individual values, the 2 extreme values are canceled.



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