SPEKTRA
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Deutsche Akkreditierungsstelle GmbH

als Kalibrierlaboratorium im / *as calibration laboratory in the*

Deutschen Kalibrierdienst DKD

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

Kalibrierschein
Calibration Certificate

Kalibrierzeichen
Calibration mark

0 2 9 1 8
D-K-15183-01-00
2020-02

Gegenstand *Object*	**Measurement chain** **Triaxial-Accelerometer ~ Evaluation unit**
Hersteller *Manufacturer*	**Montronix**
Typ *Type*	**PulseNG-Diag ~ IBU-NG**
Fabrikat/Serien-Nr. *Serial number*	**LC18060782 ~ MTXIB19431078**
Auftraggeber *Customer*	**Montronix GmbH** **DE-71720 Oberstenfeld**
Auftragsnummer *Order No.*	**AG20-00436**
Anzahl der Seiten des Kalibrierscheines *Number of pages of the certificate*	**6**
Datum der Kalibrierung *Date of calibration*	**17/02/2020**

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*	Stellv. Leiter des Kalibrierlaboratoriums *Deputy head of the calibration laboratory*	Bearbeiter *Person in charge*
06/03/2020	Mario Gutbier	Michael Bürger

DK20-02918/6

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1. Object of Calibration

Object:	**Triaxial-Accelerometer**	**Evaluation unit**
Manufacturer:	**Montronix**	**Montronix**
Type:	**PulseNG-Diag**	**IBU-NG**
Serial number:	**LC18060782**	**MTXIB19431078**

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:	**(24.0 ± 1) °C**
Relative humidity:	**(39 ± 5) %**

4. Test Conditions

Position of exciting axis (axes) relative to the earth gravity:	**vertical**
Temperature of test object:	**(24.0 ± 2) °C**
Attachment of test object to vibration exciter:	**glued (Cyanacrylat)**
Technical data of the connecting cable	
Manufacturer:	**customer cable**
Type:	**NN**
Switch position on the object of calibration	
Application software:	**Version Rev. 141**
Settings:	**Measuring range: 0 - 1350 Hz**
Determinating of the deviation of display	
Frequency range:	**122 Hz**
Acceleration (rms):	**20 m/s²**
(acceleration due to gravity 1 g_n = 9.80665 m/s²)	
Determinating of the deviation of display	
Frequency range:	**10 Hz - 1300 Hz**
Acceleration (rms):	**see table**
Number of frequency points on log scale:	**11**

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5. Measurement Uncertainty

These are the total relative measurement uncertainties at **provided** values:
- for determination of the deviation of displayed values within the frequency range

10 Hz bis	<20 Hz	1.5%
20 Hz bis	1000 Hz	1.0%
>1000 Hz bis	1300 Hz	1.5%

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 EA-4/02 M:2013. The values of the measuring quantity fall into the assigned intervals with a probability of 95 %.

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6. Components of the Reference Measuring Equipment

	Manufacturer	Type	Serial number
Vibration exciter	SPEKTRA	SE-10	017
Ref. standard transducer	PCB	M353B17	LW196211
Calibration system	SPEKTRA	CS18 DKD 7	200819

7. Results

7.1 Determination of calibration value at reference point

Frequency range: **122 Hz**
Acceleration (rms): **20 m/s²**

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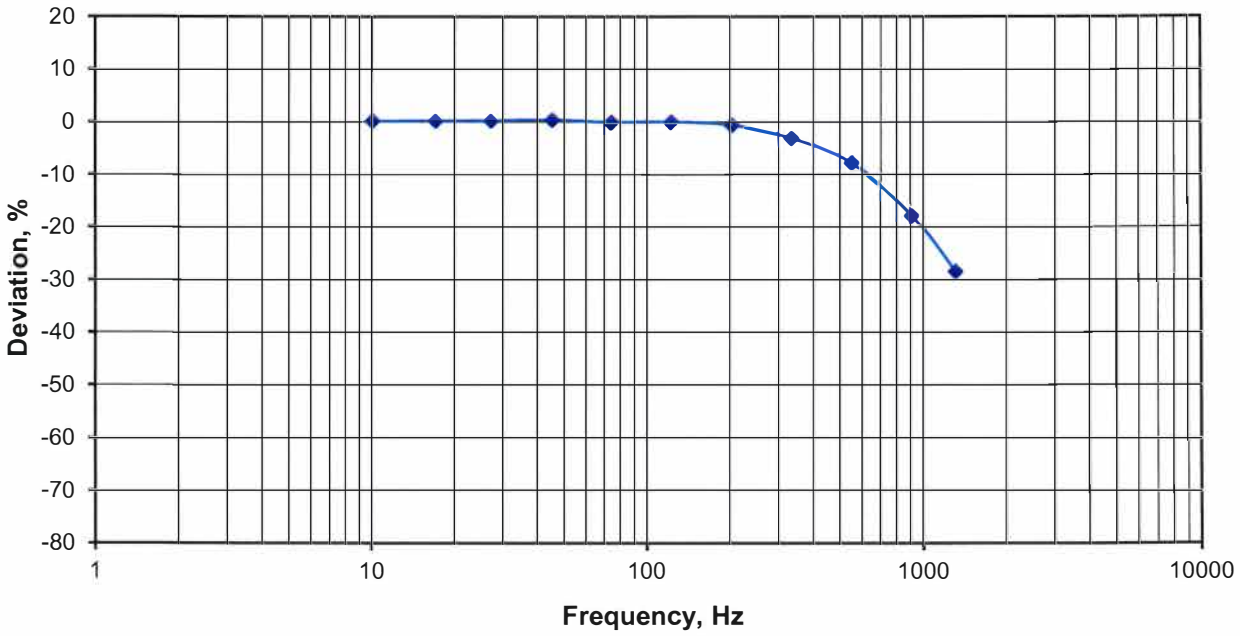
7.2 Deviation of displayed value (absolute and frequency response relative to 122 Hz)

x-axis

Frequency, in Hz	provided acceleration, (rms) m/s²	Displayed value, m/s²	Deviation of displayed value, dB	Deviation of displayed value, %	Deviation of displayed value, relat. to 122 Hz %
10	4.1	4.184	0.15	1.8	0.1
17	20.1	20.50	0.16	1.8	0.2
27	20.1	20.46	0.16	1.9	0.2
45	20.0	20.44	0.17	2.0	0.4
74	20.0	20.33	0.13	1.6	-0.1
122	**20.0**	**20.33**	**0.14**	**1.6**	**0.0**
202	20.0	20.21	0.09	1.0	-0.6
334	20.0	19.73	-0.13	-1.4	-3.1
551	20.0	18.78	-0.56	-6.2	-7.8
909	20.0	16.77	-1.54	-16.2	-17.8
1300	20.0	14.63	-2.72	-26.8	-28.5

Frequency response relative to 122 Hz



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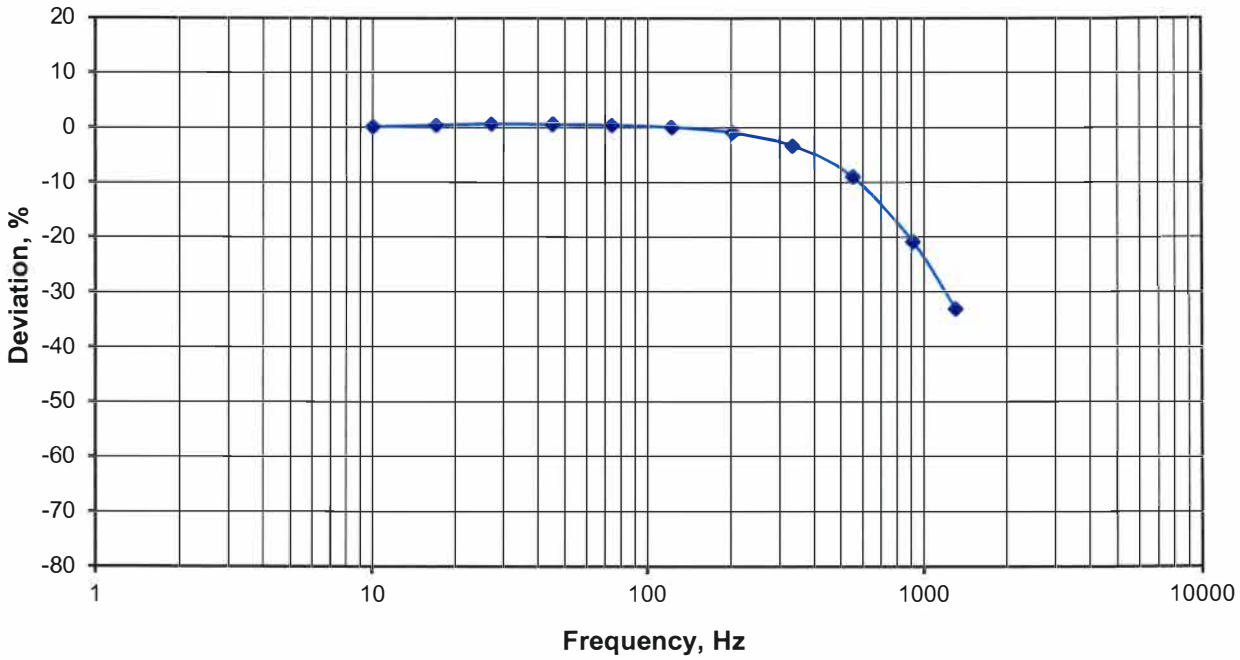
y-axis

Frequency, in Hz	provided acceleration, (rms) m/s²	Displayed value, m/s²	Deviation of displayed value, dB	Deviation of displayed value, %	Deviation of displayed value, relat. to 122 Hz %
10	4.1	4.151	0.06	0.7	0.1
17	20.2	20.39	0.09	1.0	0.4
27	20.1	20.34	0.11	1.2	0.6
45	20.1	20.28	0.10	1.1	0.5
74	20.0	20.22	0.09	1.0	0.4
122	**20.0**	**20.13**	**0.05**	**0.6**	**0.0**
202	20.0	19.94	-0.03	-0.3	-1.0
334	20.0	19.49	-0.23	-2.7	-3.3
551	20.0	18.34	-0.76	-8.4	-9.0
909	20.0	15.95	-1.97	-20.3	-20.9
1300	20.0	13.52	-3.40	-32.4	-33.0

Frequency response relative to 122 Hz



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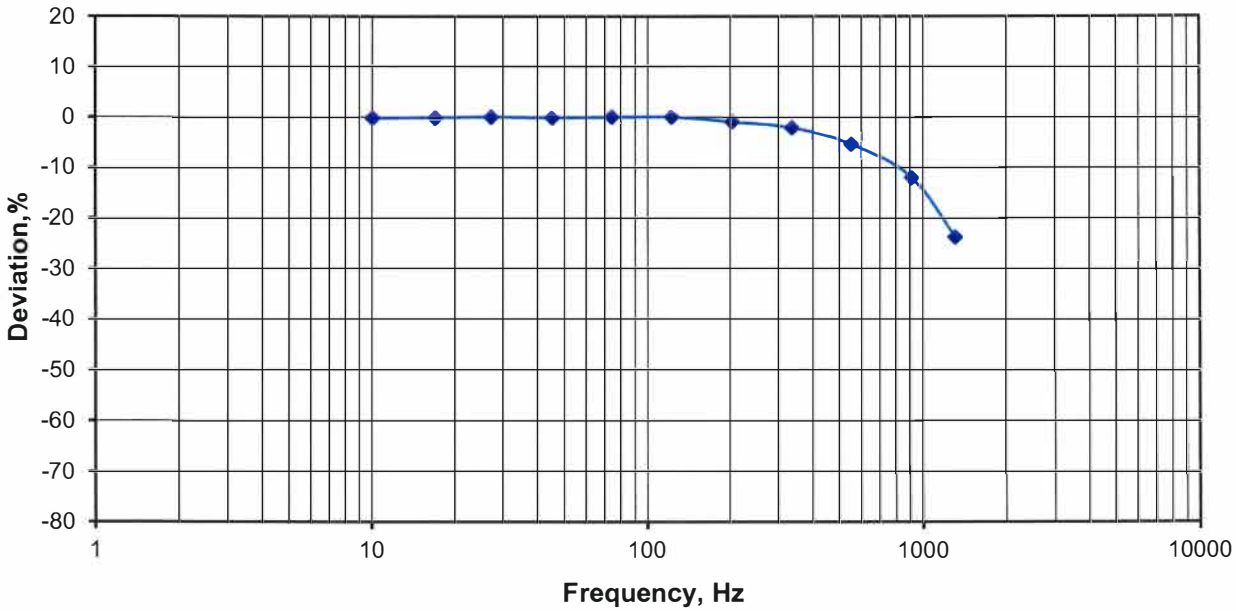
z-axis

Frequency, in Hz	provided acceleration, (rms) m/s²	Displayed value, m/s²	Deviation of displayed value, dB	Deviation of displayed value, %	Deviation of displayed value, relat. to 122 Hz %
10	4.1	4.013	-0.21	-2.3	-0.2
17	20.1	19.68	-0.20	-2.2	-0.1
27	20.1	19.64	-0.19	-2.1	0.0
45	20.0	19.58	-0.20	-2.3	-0.1
74	20.0	19.59	-0.19	-2.2	0.0
122	**20.0**	**19.58**	**-0.19**	**-2.2**	**0.0**
202	20.0	19.39	-0.27	-3.1	-1.0
334	20.0	19.16	-0.38	-4.3	-2.1
551	20.0	18.52	-0.68	-7.5	-5.4
909	20.0	17.17	-1.33	-14.2	-12.0
1300	20.0	14.80	-2.62	-26.0	-23.9

Frequency response relative to 122 Hz



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