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Deutschen Kalibrierdienst




Deutsche
Akkreditierungsstelle
D-K-15183-01-00

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Kalibrierzeichen
Calibration mark

2020-02

Kalibrierschein

Calibration Certificate

Gegenstand
Object

Measurement chain
Triaxial-Accelerometer ~ Evaluation unit

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).

Hersteller
Manufacturer

Montronix

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.

Typ
Type

PulseNG-hmi ~ IBU-NG

Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

Fabrikat/Serien-Nr.
Serial number

LC18060782 ~ MTXIB19431078

This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI).

Auftraggeber
Customer

Montronix GmbH
DE-71720 Oberstenfeld

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.

Auftragsnummer
Order No.

AG20-00436

The user is obliged to have the object recalibrated at appropriate intervals.

Anzahl der Seiten des Kalibrierscheines
Number of pages of the certificate

9

Datum der Kalibrierung
Date of calibration

17/02/2020

Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung sowohl der Deutschen Akkreditierungsstelle GmbH als auch des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine ohne Unterschrift haben keine Gültigkeit.

This calibration certificate may not be reproduced other than in full except with the permission of both the Deutsche Akkreditierungsstelle GmbH and the issuing laboratory. Calibration certificates without signature are not valid.

Datum
Date

Stellv. Leiter des Kalibrierlaboratoriums
Deputy head of the calibration laboratory

Bearbeiter
Person in charge

06/03/2020

Mario Gutbier

Michael Bürger

DK20-02919/9



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1. Object of Calibration

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

2. Calibration Method

Calibration was performed using the method of comparison according to Directive DAkk S-R 3-1.
The transducer was exposed to sinusoidal acceleration which was applied by means of an electrodynamic 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: **(23.8 ± 1) °C**
Relative humidity: **(39 ± 5) %**

4. Test Conditions

Position of exciting axis (axes) relative to the earth gravity: **vertical**
Temperature of test object: **(23.8 ± 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. 521**
Settings: **Measuring range: 50 - 1350 Hz (RMS 100)**

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

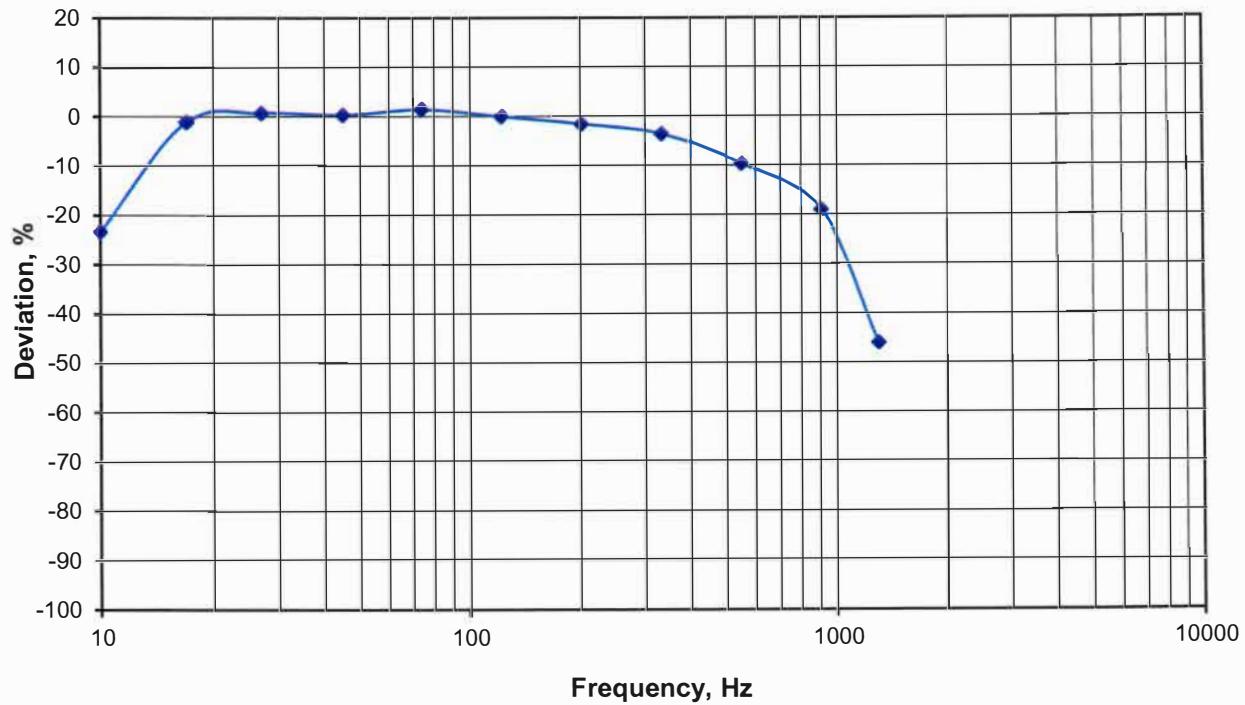
Frequency, Hz	provided acceleration, (rms) m/s ²	Displayed value, m/s ²	Deviation of displayed value,		Deviation of displayed value, relat. to 122 Hz %
			dB	%	
10	4.1	3.2	-2.20	-22.4	-23.3
17	20.1	20.1	-0.01	-0.2	-1.1
27	20.1	20.4	0.15	1.7	0.7
45	20.0	20.3	0.11	1.3	0.4
74	20.0	20.5	0.21	2.4	1.4
122	20.0	20.2	0.08	1.0	0.0
202	20.0	19.9	-0.05	-0.6	-1.5
334	20.0	19.5	-0.23	-2.6	-3.5
551	20.0	18.3	-0.78	-8.6	-9.6
909	20.0	16.4	-1.73	-18.0	-19.0
1300	20.0	11.0	-5.20	-45.0	-46.0

Frequency, Hz	provided acceleration, (rms) mm/s	Displayed value, mm/s	Deviation of displayed value,		Deviation of displayed value, relat. to 122 Hz %
			dB	%	
10	65.6	1.5	-32.82	-97.7	-96.2
17	188.5	16.5	-21.16	-91.2	-89.7
27	118.2	28.9	-12.23	-75.5	-74.0
45	70.9	42.1	-4.52	-40.6	-39.1
74	43.1	38.8	-0.90	-9.9	-8.4
122	26.1	25.7	-0.13	-1.5	0.0
202	15.8	15.6	-0.09	-1.1	0.5
334	9.5	9.3	-0.22	-2.5	-1.0
551	5.8	5.3	-0.76	-8.4	-6.8
909	3.5	2.8	-1.95	-20.1	-18.5
1300	2.4	1.3	-5.50	-46.9	-45.4

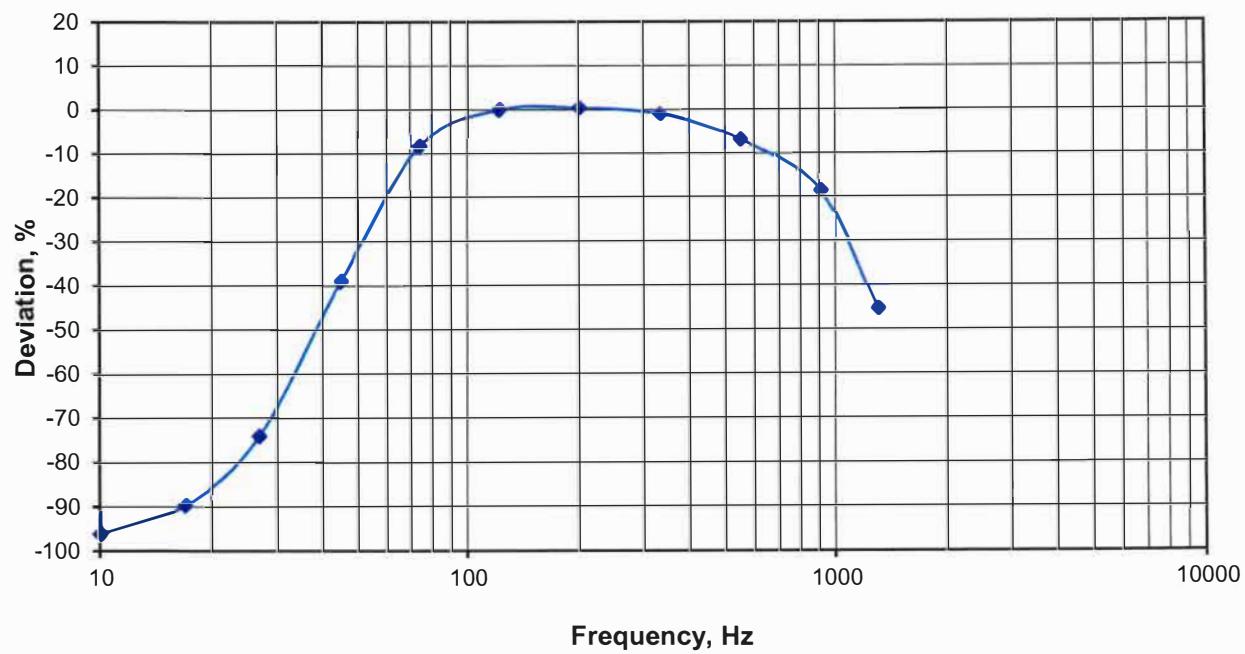


Frequency response relative to 122 Hz

Acceleration:



Velocity:



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y-axis

Frequency, Hz	provided acceleration, (rms) m/s ²	Displayed value, m/s ²	Deviation of displayed value,		Deviation of displayed value, relat. to 122 Hz %
			dB	%	
10	4.1	3.2	-2.21	-22.5	-24.5
17	20.2	20.3	0.06	0.7	-1.3
27	20.1	20.5	0.19	2.2	0.2
45	20.0	20.5	0.20	2.3	0.3
74	20.0	20.6	0.25	2.9	0.9
122	20.0	20.4	0.17	2.0	0.0
202	20.0	20.2	0.08	0.9	-1.0
334	20.0	19.7	-0.14	-1.6	-3.5
551	20.0	18.7	-0.59	-6.6	-8.6
909	20.0	16.6	-1.62	-17.0	-19.0
1300	20.0	11.0	-5.20	-45.0	-47.0

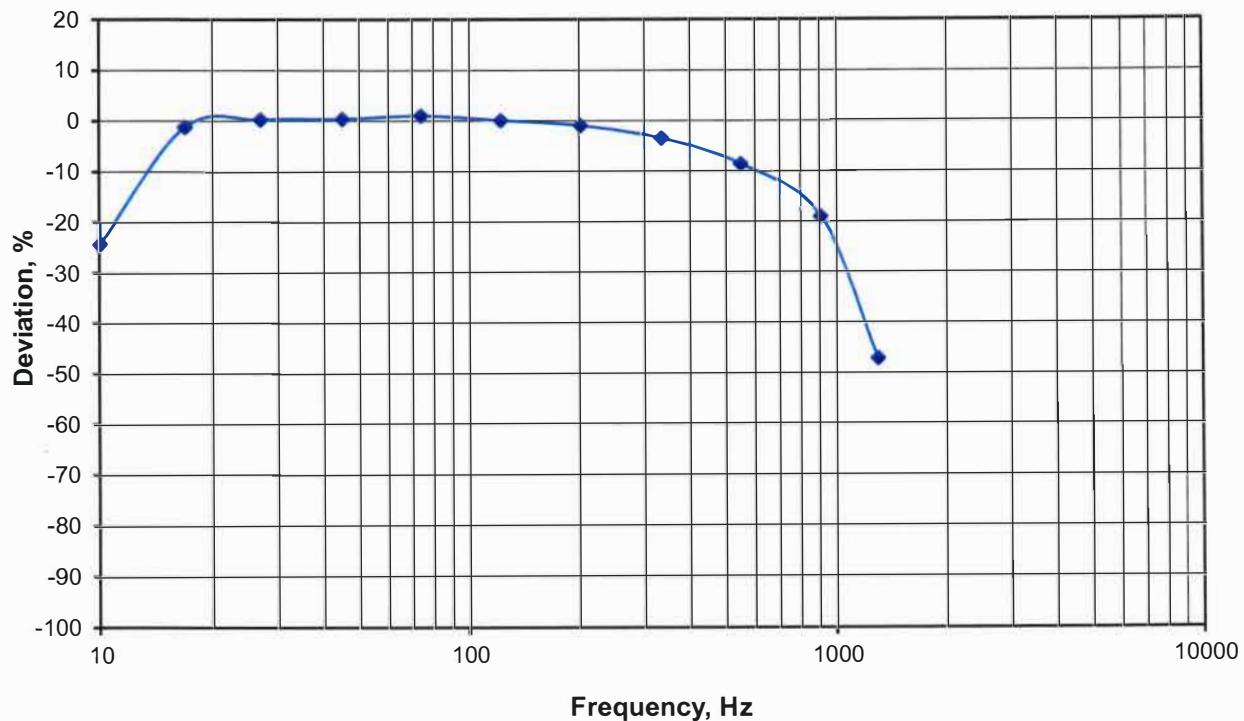
Frequency, Hz	provided acceleration, (rms) mm/s	Displayed value, mm/s	Deviation of displayed value,		Deviation of displayed value, relat. to 122 Hz %
			dB	%	
10	65.6	1.5	-32.82	-97.7	-97.3
17	188.5	16.7	-21.05	-91.1	-90.8
27	118.2	29.1	-12.17	-75.4	-75.0
45	70.9	42.5	-4.44	-40.0	-39.6
74	43.1	39.0	-0.86	-9.4	-9.0
122	26.1	26.0	-0.03	-0.4	0.0
202	15.8	15.8	0.02	0.2	0.6
334	9.5	9.4	-0.13	-1.4	-1.1
551	5.8	5.4	-0.60	-6.6	-6.2
909	3.5	2.9	-1.64	-17.2	-16.8
1300	2.4	1.4	-4.86	-42.8	-42.5



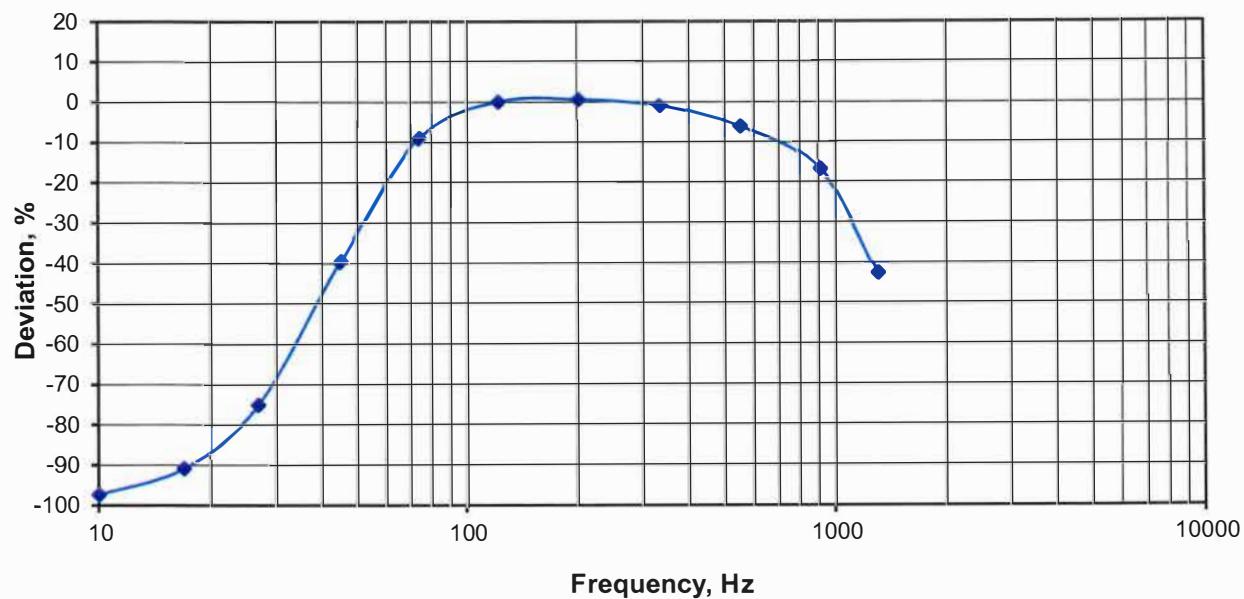
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Frequency response relative to 122 Hz

Acceleration:



Velocity:



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z-axis

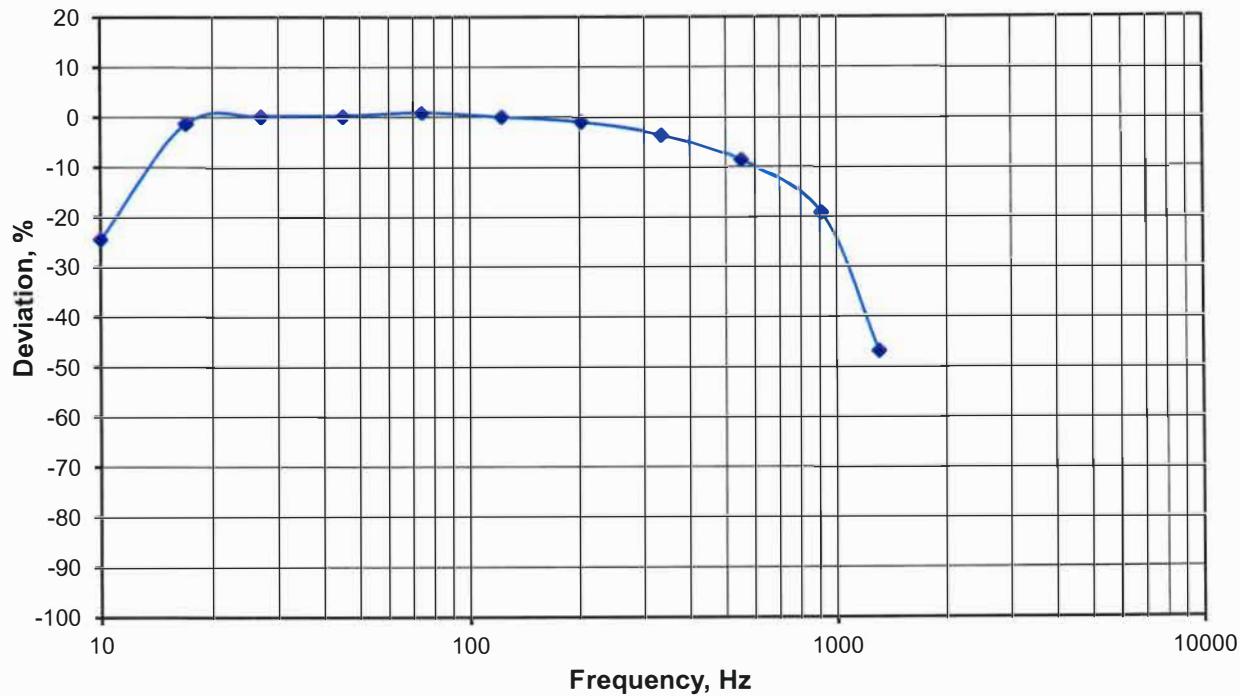
Frequency, Hz	provided acceleration, (rms) m/s ²	Displayed value, m/s ²	Deviation of displayed value,		Deviation of displayed value, relat. to 122 Hz %
			dB	%	
10	4.1	3.1	-2.47	-24.7	-23.2
17	20.1	19.5	-0.28	-3.2	-1.6
27	20.1	19.7	-0.16	-1.8	-0.3
45	20.0	19.6	-0.19	-2.2	-0.7
74	20.0	19.8	-0.10	-1.1	0.4
122	20.0	19.7	-0.13	-1.5	0.0
202	20.0	19.4	-0.27	-3.1	-1.5
334	20.0	19.2	-0.36	-4.1	-2.5
551	20.0	18.5	-0.69	-7.6	-6.1
909	20.0	17.0	-1.42	-15.0	-13.5
1300	20.0	12.0	-4.44	-40.0	-38.5

Frequency, Hz	provided acceleration, (rms) mm/s	Displayed value, mm/s	Deviation of displayed value,		Deviation of displayed value, relat. to 122 Hz %
			dB	%	
10	65.6	1.4	-33.42	-97.9	-93.7
17	188.5	15.9	-21.48	-91.6	-87.4
27	118.2	27.9	-12.54	-76.4	-72.2
45	70.9	40.7	-4.82	-42.6	-38.3
74	43.1	37.6	-1.18	-12.7	-8.5
122	26.1	25.0	-0.37	-4.2	0.0
202	15.8	15.2	-0.32	-3.6	0.6
334	9.5	9.1	-0.41	-4.6	-0.4
551	5.8	5.3	-0.76	-8.4	-4.1
909	3.5	3.0	-1.35	-14.4	-10.1
1300	2.4	1.4	-4.86	-42.8	-38.6



Frequency response relative to 122 Hz

Acceleration:



Velocity:

