m+p international


# Calibrating Your Transducers

## m+p SensCal

Regular transducer calibration is an essential requirement for maintaining the accuracy, reliability and repeatability of the results obtained from a measurement system. m+p international's new m+p SensCal program provides a quick and simple process for calibrating accelerometers (piezo-electric with charge output or IEPE, piezo-resistive, capacitive) in your laboratory, as well as velocity or displacement transducers.

We offer the m+p SensCal program as an add-on to a wider vibration test system for checking its transducers without any additional acquisition hardware; or it can be utilized as a standalone calibration system.

m+p SensCal uses a reference accelerometer and shaker system to measure the sensitivity of the sensor-under-test (SUT).

The following calibration methods are supported:

- Calibration with fixed sine frequencies: You specify a set of discrete sine frequencies. These are driven step by step and the transducer will be calibrated for exactly the frequencies required.
- Calibration using random signals: The transducer will be calibrated over a specific frequency range using a random excitation signal. As the entire frequency range is excited at once, the procedure is very effective.
- Test run via a sine sweep over standard or user-defined frequency and acceleration ranges.

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**Precise calibration of accelerometers, displacement and velocity transducers**

**Cost- and time-saving in your own lab**

**No additional acquisition hardware required**

**Detailed calibration certificate**

**Early detection of incorrect transducer sensitivities**

m+p SensCal system with m+p VibPilot front-end

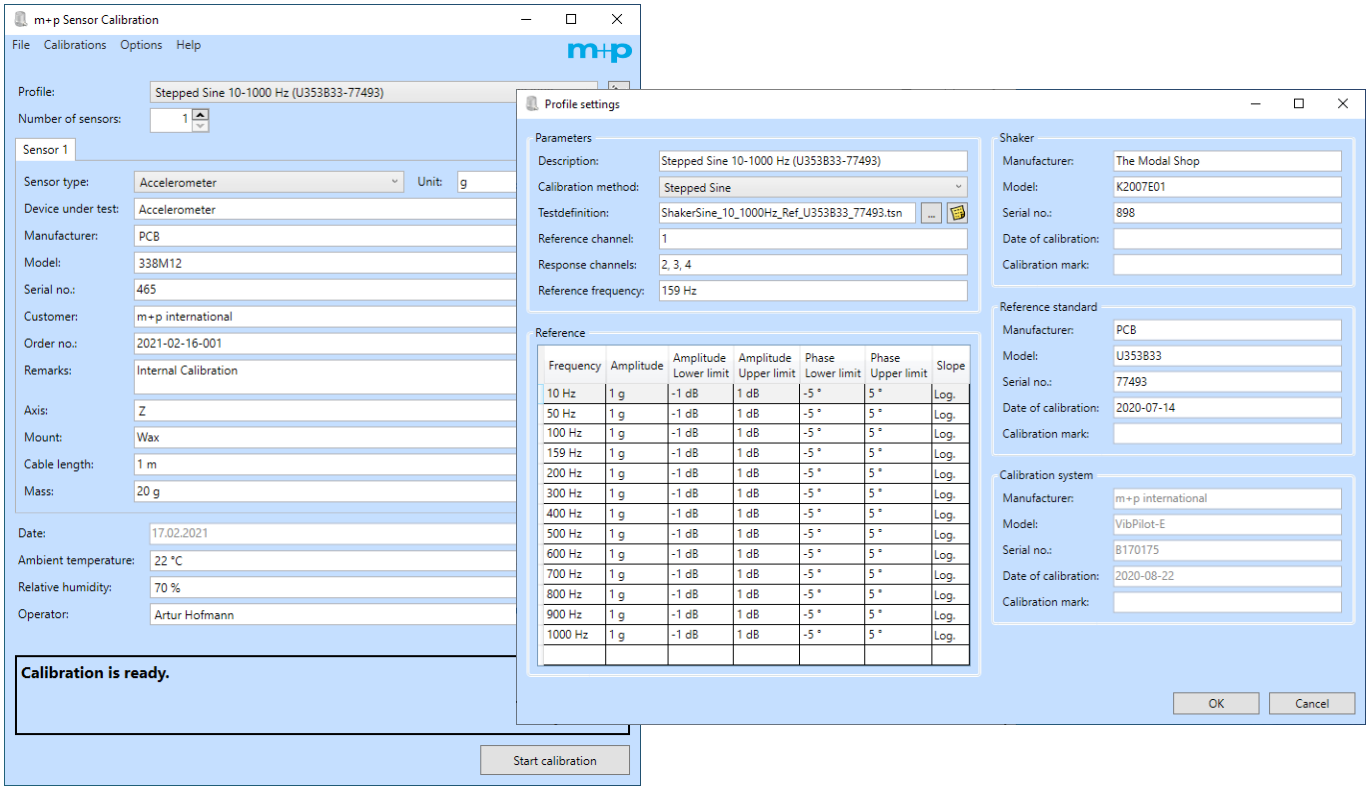
A complete m+p SensCal system consists of:

- shaker
- reference accelerometer
- m+p international measurement front-end (m+p VibPilot, m+p VibRunner, m+p VibMobile)
- m+p VibControl (ver. 2.13+) vibration control software with sine and/or random excitation and m+p SensCal

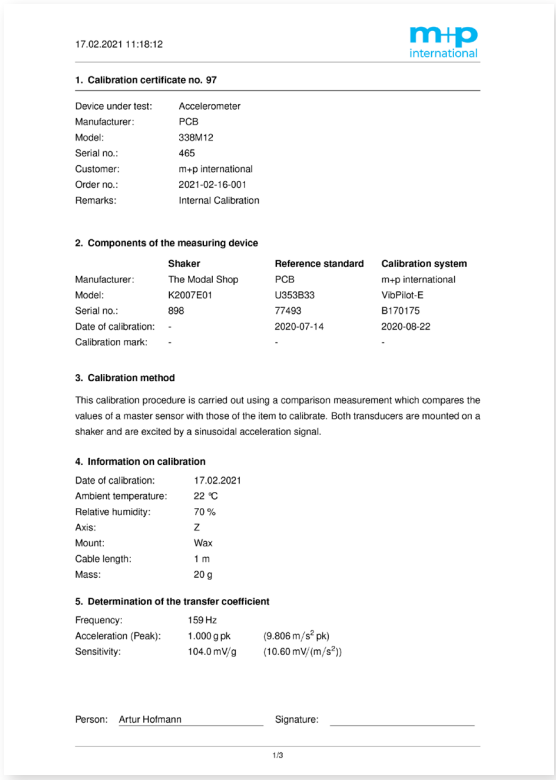
The reference transducer is mounted on the shaker, and the SUT is bolted directly to it, ensuring that the vibration experienced by both sensors is identical.

m+p SensCal is simple to operate within m+p VibControl. On-screen set-up enables the user to select a stored profile which defines the frequency range and acceleration amplitude for the test. Additional data specific to the sensor and test, such as serial number, operator, etc., can also be entered. It is possible to store several test profiles to calibrate the transducer with different amplitudes. Some customers use the tool to calibrate their transducers at the highest possible acceleration. At the conclusion of the test, comprehensive calibration data can be displayed including graphs showing the deviation of amplitude and phase response of the SUT from that of the reference accelerometer.

After the calculation process, m+p SensCal creates a detailed calibration certificate with company logo as PDF. It shows, among other things, the sensitivity and the transmissibility with phase information.




m+p SensCal settings



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**1. Calibration certificate no. 97**

| | |
|---|---|
| Device under test: | Accelerometer |
| Manufacturer: | PCB |
| Model: | 338M12 |
| Serial no.: | 465 |
| Customer: | m+p international |
| Order no.: | 2021-02-16-001 |
| Remarks: | Internal Calibration |

**2. Components of the measuring device**

| | Shaker | Reference standard | Calibration system |
|---|---|---|---|
| Manufacturer: | The Modal Shop | PCB | m+p international |
| Model: | K2007E01 | U353B33 | VibPilot-E |
| Serial no.: | 898 | 77493 | B170175 |
| Date of calibration: | - | 2020-07-14 | 2020-08-22 |
| Calibration mark: | - | - | - |

**3. Calibration method**

This calibration procedure is carried out using a comparison measurement which compares the values of a master sensor with those of the item to calibrate. Both transducers are mounted on a shaker and are excited by a sinusoidal acceleration signal.

**4. Information on calibration**

| | |
|---|---|
| Date of calibration: | 17.02.2021 |
| Ambient temperature: | 22 °C |
| Relative humidity: | 70 % |
| Axis: | Z |
| Mount: | Wax |
| Cable length: | 1 m |
| Mass: | 20 g |

**5. Determination of the transfer coefficient**

| | | |
|---|---|---|
| Frequency: | 159 Hz | |
| Acceleration (Peak): | 1.000 g pk | (9.806 m/s² pk) |
| Sensitivity: | 104.0 mV/g | (10.60 mV/(m/s²)) |

Person: Artur Hofmann Signature: _____

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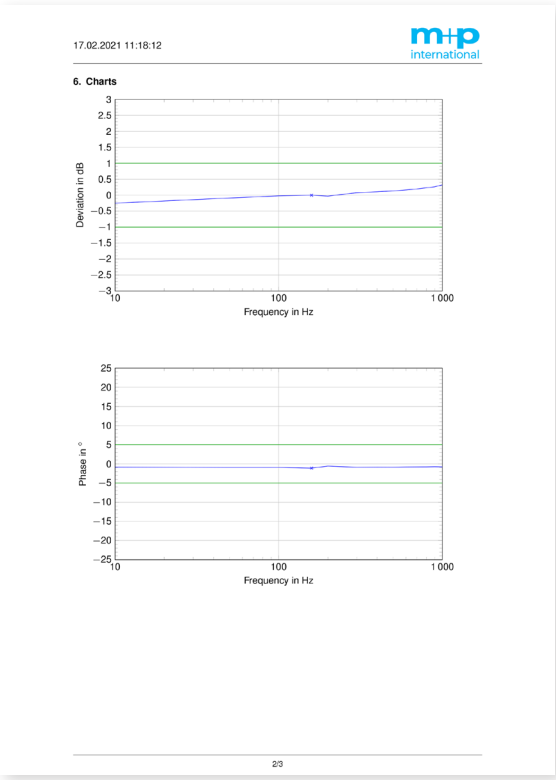

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**6. Charts**







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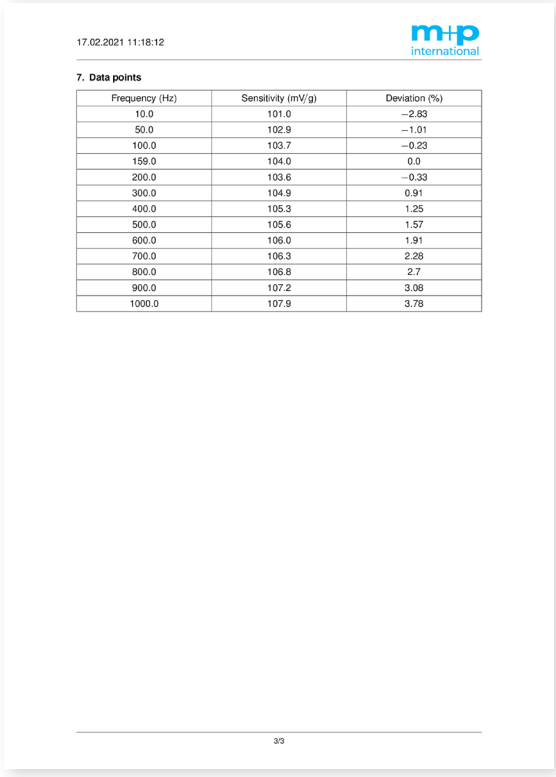

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**7. Data points**

| Frequency (Hz) | Sensitivity (mV/g) | Deviation (%) |
|---|---|---|
| 10.0 | 101.0 | −2.83 |
| 50.0 | 102.9 | −1.01 |
| 100.0 | 103.7 | −0.23 |
| 159.0 | 104.0 | 0.0 |
| 200.0 | 103.6 | −0.33 |
| 300.0 | 104.9 | 0.91 |
| 400.0 | 105.3 | 1.25 |
| 500.0 | 105.6 | 1.57 |
| 600.0 | 106.0 | 1.91 |
| 700.0 | 106.3 | 2.28 |
| 800.0 | 106.8 | 2.7 |
| 900.0 | 107.2 | 3.08 |
| 1000.0 | 107.9 | 3.78 |

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Calibration certificate with your company logo


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**Germany**
**m+p international Mess- und Rechnertechnik GmbH**
Thurnithistraße 2
30519 Hannover
Phone: (+49) (0)511 856030
sales.de@mpihome.com

**USA**
**m+p international, inc.**
271 Grove Avenue, Bldg. G
Verona, NJ 07044-1705
Phone: (+1) 973 239 3005
sales.na@mpihome.com

**United Kingdom**
**m+p international (UK) Ltd**
Mead House
Bentley, Hants
GU10 5HY
Phone: (+44) (0)1420 521222
sales.uk@mpihome.com

**France**
**m+p international Sarl**
5, rue du Chant des Oiseaux
78360 Montesson
Phone: (+33) (0)130 157874
sales.fr@mpihome.com

**China**
**Beijing Representative Office of m+p international**
Xue Qing Road No. 38
Hai Dian District, Beijing
Phone: (+86) 10 8283 8698
sales.cn@mpihome.com

**www.mpihome.com**


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