



MAESTRO

Human vibration meter



01dB-Stell
MVI technologies group

Vibration in the workplace is becoming a major concern, due to the increase in industrial injuries caused by high vibration levels.

For many products, such as power tools, low vibration levels give a competitive advantage.

Maestro is a simple and modular instrument, designed for all aspects of human vibration measurements

All dedicated measurement functions, transducers and accessories are available for whole-body and hand/arm measurements, using a triaxial accelerometer connected to the multichannel input of Maestro.

Thanks to its unique four-channel design, **Maestro** can also be used for SEAT (Seat Effective Acceleration Transmissibility) measurements, with an extra accelerometer connected to the fourth channel. Alternatively, a microphone can be connected to the fourth channel to give simultaneous measurements of noise and triaxial vibration.

The modularity of **Maestro** allows you to build up a complete configuration for your needs, at a competitive price. A basic version is also available for general purpose vibration measurements, using a mono-axial accelerometer.

With a large graphical display, and intuitive menu system, **Maestro** is always easy to use for any applications : one-off or production line tests, or health & safety, whatever the product or environment.

The AC output (for each of the four channels) can also be connected to a spectrum analyser for further analysis.



MAESTRO main functions

The Maestro human vibration meter is available with several different firmware options, perfectly adapted to the needs of each application :

- whole body (3 channels)
- hand-arm (3 channels)
- general vibration (single channel)
- noise (single channel)

All the modules are compatible and can be loaded into the instrument in any combination.

● General

- Powering for ICP® transducers
- Calibration by sensitivity or external calibrator
- 2MB non-volatile memory for datalogging results
- RS232C interface for download of results
- AC output for each channel

● Whole-body

- ISO 8041 weightings, ISO 2631-1 (1997) standard
- Peak and RMS weighted accelerations for each channel
- Weighted equivalent multiaxial acceleration calculated upon 2 modes : $a_w = \max[1.4a_{wx} ; 1.4a_{wy} ; a_{wz}]$
 $a_w = [(1.4a_{wx})^2 + (1.4a_{wy})^2 + a_{wz}^2]^{1/2}$
- Vibration dose value: VDV
- Maximum transient vibration value: MTVV
- Optional SEAT measurement (adding of a monoaxial accelerometer)

● Hand-arm

- ISO 8041, ISO 5349 (1999) standard
- Peak and RMS acceleration band pass filtered for each channel
- RMS weighted acceleration for each channel
- Weighted equivalent multiaxial acceleration :

$$a_w = [a_{wx}^2 + a_{wy}^2 + a_{wz}^2]^{1/2}$$

● Vibration (available alone or as option on 3 channel version)

- Frequency range 0.4-1000 Hz or 10-10000 Hz
- Peak and RMS acceleration band pass filtered

● Noise (available as option on 3 channel version)

- Type 2 accuracy according to IEC804
- Leq (A, C, Lin) and Peak (C, Lin) in parallel
- Measurement range for standard ICP transducer of 50 mV/Pa : 37-130 dB (Leq A)

MAESTRO applications

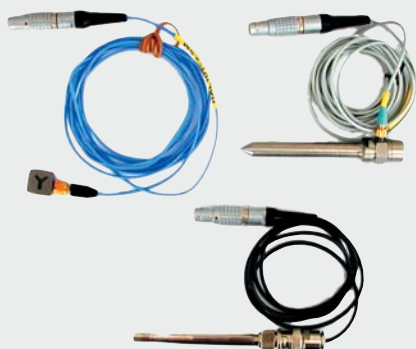
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Whole-body

Supplied with a seat adapter (rubber pad) for housing the low-frequency triaxial accelerometer, and featuring the corresponding ISO weightings, Maestro is a complete whole body vibration measurement system.

The SEAT option uses the 4th channel to connect an accelerometer for "z" reference to calculate the SEAT coefficient.

A tough mounting bracket can be used to mount Maestro for on-board measurements.



Transducers and cables

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Hand-arm

Using the same lightweight transducer as for the whole body measurement, but mounted on a hand adapter, Maestro provides the Peak and RMS acceleration according to ISO standards, including vector sum.

For simple measurements, the optional single axis accelerometer can be used with a probe tip.

For measurements on hand tools, the noise option allows simultaneous Leq and Peak measurements along with the vibration data. Works with a small rugged ICP® microphone.

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Vibration meter

The basic configuration of Maestro provides single channel measurements. RMS measurements are available.

The ISO human vibration weightings are not included with this option, but the basic instrument can be updated at any time to give a fully configured instrument as above.

MAESTRO Software packages

With a memory capacity of 2MB, Maestro can store up to 999 files, with date/time information from the built-in real time clock.

The dBTRAIT32 or dBFA32 software is available for transferring stored results from the internal memory to a PC.

Processing of results is performed by the PC, giving time history plots of all acquired parameters, along with maximum, minimum and statistical results.

Graphs and tables can be printed directly or exported to word processors or spreadsheets for further presentation or archiving.



Characteristics by model

Channels	From 1 to 4
Conditioning	ICP® accelerometers, ICP® preamplifiers and microphones
Input	8 pin LEMO connector
Transducers	10 mV/g accelerometer and 50 mV/Pa ICP® microphone included in standard configuration - Other transducers optional (100 mV/g accelerometer, 12.5 and 25 mV/Pa ICP® microphone with automatic adjustment of ranges and storage of calibration corrections)
Overload	Independent detector for each channel
Ranges	3 with amplification of 0 dB, 14 dB and 34 dB
Calibration	Vibration : calibrator or sensitivity edition - Sound : calibrator only
Memory	2 MB (approximately 17 h with 1 s time base)
Storage mode	Data-logging or start-stop
Serial interface	RS232 for data transfer
Analog outputs	Band pass filtered 0.4 - 10000 Hz - Level +/- 1 V (+/- 5 %) Output impedance : 100 Ohms - 4 pin Lemo connector
ADC	Input : 4 x 20 bits, sampling frequency 24 kHz
DAC	Output : 4 x 20 bits DAC, sampling frequency 24 kHz
Battery life	Approx. 8 h (4 channels), 13 h (1 channel) Control of the residual battery life
Dimensions	21 cm x 9 cm x 5 cm
Weight	With batteries : 520 g
Temperature	Operating from -10 to 50°C.

Vibration channels

Accuracy	Class 1, ISO 8041 standard
Display resolution	0.01 m/s ² for RMS, 0.1 m/s ² for Peak

Standard triaxial accelerometer

Sensitivity	10 mV/g
Freq. response	0.5 to 6000 Hz
Max. accelerations	500 g
Weight	10.5 g (15.9 g with hand arm adapter)

Standard monoaxial accelerometer

Sensitivity	10 mV/g
Cut-off freq.	0.1 Hz (10 %)
Max. value	500 g
Weight	18 g

Measurement ranges

Standard of ranges	Peak ranges : 0-5000 m/s ² , 0-1000 m/s ² , 0-100 m/s ² RMS ranges are limited by a maximum displayed value of 655 m/s ²
Linearity range	Peak : from 2 to 5000 m/s ² - RMS : from 0.2 to 655 m/s ²

Whole body

Results	Calculations and display of peak and RMS weighted accelerations according to the whole body filters ISO 8041 / A1 : 1998 2 modes of calculation for multiaxial equivalent acceleration VDV and MTVV
Option	SEAT measurement (Seat Effective Acceleration Transmissibility) : display of Peak and RMS weighted Z acceleration (from 4 th channel) display of Z acceleration measured at seat level and vehicle floor ratio

Hand arm vibrations

Results	Calculation and display of Peak and RMS accelerations on 3 axis band pass filtered (4 axis if using Aux) : 6.3-1250 Hz Weighted RMS accelerations on 3 axes (4 if using Aux) hand arm filters according to ISO 8041 / A1 : 1998 Multiaxial equivalent acceleration on weighted channels
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Basic vibration meter

Results	Peak and RMS accelerations band pass filtered 0.4-1000 Hz or 10-1000 Hz
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Acoustic channel (optional)

Accuracy	Class 2, IEC 651 and IEC 804
Measured quantities	Leq A, C, Lin, Peak C and Lin
Display resolution	0.1 dB

Standard ICP microphone

Microphone type	Electret 1/4"
Sensitivity	50 mV/Pa +/- 5%
Frequency response	30 Hz to 15 kHz (+/- 3 dB)
Acoustic linearity range	Leq A 37 - 130 dB, Leq C 40 - 130 dB, Leq L 44 - 130 dB Peak C 53 - 133 dB, Peak L 58 - 133 dB
Other	Possibility to connect ICP® transducers of sensitivities 25 or 12.5 mV/Pa with automatic range adjustment

Accessories

Accelerometers and microphones
Seat pad and hand arm adapters
Magnetic mounting base and probe tip for monaxial accelerometer
Pouch, carrying case
Cables for analog output
Mounting bracket to fix Maestro on any device
Calibrators

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Benefits

Multi-application

4 channels simultaneously

Digital filtering

Robust

Ease of use

Complete

Noise option



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Designed in collaboration
with INRS

Production and servicing for
calibration and repair

The presented characteristics are subject to
change without notice. E&EO