CESVA
acoustic instruments

VC431

Triaxial Vibrometer

The **VC431** is a high performance vibrometer; the ideal instrument for measuring vibration according to:

• Directive 2002/44/EC on risks deriving from workers' exposure to vibration.

°Vibrations transmitted to the hand-arm system (HA)
°Vibrations transmitted to the whole body (WB)

The **VC431** enables the user simply and comfortably to follow the technical guides for the evaluation and prevention risks related to mechanical vibration of most countries.

• Nacional laws and regulations on noise and vibrations:

°Whole body in buildings vibrations (WBB)

The VC431 can also evaluate the effect of vibration on the structure of buildings and the terrain:

• The UNE 22-381-93 Standard Control of vibrations produced by blasting with explosives and transmitted by the terrain.

Applications
• **Assessment of workers' exposure to vibration:**
  • **Hand Arm (HA)**
    2002/44/EC
    ISO 5349-1
    ISO 5349-2
  • **Whole Body (WB)**
    2002/44/EC
    ISO 2631-1
• **Assessment of vibration in buildings:**
  • **ISO 2631-2 (Buildings)**
• **Evaluation of the effect of vibration on the Structure of buildings and the terrain:**
  • **UNE 22-381-93**

User-Friendly
• **Measures all parameters simultaneously for each application (HA, WB, Buildings and Structure).**
• **Single measurement scale, independent of the application (HA, WB, Buildings, and Structure).**
• **Projected information displayed during the measurement.**
• **Large 3,2" high resolution, backlit graphic display.**
• **Just three operating keys (Soft key).**

Characteristics
• **Large storage capacity; saves the time history of the measurement.**
• **Downloading and powering via USB port.**
• **Projection of parameters; evaluation of exposure to vibration for measurement times below the exposure time.**
• **Software: CESVA Capture Studio (SFT030) and CESVA Studio Editor (optional).**
• **Accelerometer different for each application (HA, WB, Buildings/Structure).**
• **Vibrometer complies with norm ISO 8041.**

Following the philosophy that characterises all **CESVA** instruments, the **VC431** is user-friendly, with a single range (no scale changes) and simultaneous measurement of all parameters.

It has an intuitive, visual menu and option structure. There is no need to set the language as it has easily recognisable and identifiable icons.

Any application or adjustment can be accessed from the main menu. To do this simply select the icon required.

It has three vibration measurement applications: Hand Arm (HA), Whole Body (WB), Whole Body in Buildings (WBB) and Structure (S). These comply with European directive 2002/44/CE on risks at work from vibration, and with ISO 2631-2.

The vibrometer enables the user to work with triaxial accelerometers as each of its measurement applications requires a specific triaxial accelerometer.

For the sake of comfort, the sensitivity adjustments of various accelerometers are saved so that there is no need to carry out a sensitivity adjustment every time a measurement is carried out in a different mode.

The **VC431** enables all the necessary parameters to be measured simultaneously, to evaluate exposure to vibration in m/s^2 or dB (dB only available for buildings), with the appropriate weightings: Wd [x,y] and Wk [z] for WB, Wh [x,y,z] for HA and Wm [x,y,z] for WBB. It also has a large memory for storing both final results and the time history of the parameters measured, so they can subsequently be recalculated for any stretch.

The registers saved in the memory can be deleted via menu of the **VC431**. All the registers can be deleted at once, or just a selected one.

In addition it enables measurements shorter than the exposure time to be made, as it displays on-screen the parameters projected to the expected exposure time (programmable projection time [t_p]).

The CESVA Capture Studio (SFT030) computer software is included with the vibrometer. This application enables measurements carried out with the instrument to be downloaded via the USB port, and the results analysed quickly and simply. While it is connected to the USB port of a computer it does not need batteries as it is powered via the computer's USB.

The **VC431** does not only make the task of measuring and evaluating vibration easier, it also provides all the necessary data for worker information and training on the significance and potential risks of the results of the measurements carried out.

Its reduced weight, versatility and user-friendliness make it the hand-held instrument *par excellence* for evaluations of risks related to vibration. The **VC431** is a personal instrument; the workers themselves can carry it to evaluate their exposure to vibration.

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Functions available

Modo Hand Arm (HA)

Modo Whole Body

Modo Whole Body edificación (WBB)

Modo Estructura (S)

Func.	Description of HAND ARM (HA) Mode functions
a_{hx}	Rms value of acceleration in the x axis with W_h weighting
a_{hy}	Rms value of acceleration in the y axis with W_h weighting
a_{hz}	Rms value of acceleration in the z axis with W_h weighting
a_{hv}	Total value of acceleration
$A(8)$	Daily exposure to vibration
$A(8)_p$	Projected daily exposure to vibration
t_p	Projection time (programmable)
t	Measurement time

Func.	Description of WHOLE BODY (WB) Mode functions
a_{dx}	Rms value of acceleration in the x axis with W_d weighting
a_{dy}	Rms value of acceleration in the y axis with W_d weighting
a_{kz}	Rms value of acceleration in the z axis with W_k weighting
$A_x(8)$	Daily exposure to vibration in the x axis
$A_y(8)$	Daily exposure to vibration in the y axis
$A_z(8)$	Daily exposure to vibration in the z axis
$A_x(8)_p$	Projected daily exposure to vibration in the x axis
$A_y(8)_p$	Projected daily exposure to vibration in the y axis
$A_z(8)_p$	Projected daily exposure to vibration in the z axis
$A(8)$	Daily exposure to vibration
$A(8)_p$	Projected daily exposure to vibration
t_p	Projection time (programmable)
t	Measurement time

Func.	Description of WHOLE BODY in buildings Mode functions
a_{mx}	Rms value of acceleration in the x axis with W_m weighting
a_{my}	Rms value of acceleration in the y axis with W_m weighting
a_{mz}	Rms value of acceleration in the z axis with W_m weighting
a_{mv}	Total combined acceleration value
$MTVV_x$	Slow max acceleration value in the x axis with W_m weighting
$MTVV_y$	Slow max acceleration value in the y axis with W_m weighting
$MTVV_z$	Slow max acceleration value in the z axis with W_m weighting
$MTVV$	Slow max acceleration value with W_m weighting
t	Measurement time

Func.	Description of STRUCTURE (S) Mode functions
v_{pkx}	Peak value of the speed vector on the x axis
v_{pky}	Peak value of the speed vector on the y axis
v_{pkz}	Peak value of the speed vector on the z axis
f_x	Frequency at which the v_{pkx} value takes place
f_y	Frequency at which the v_{pky} value takes place
f_z	Frequency at which the v_{pkz} value takes place
t	Measurement time

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Accelerometers (not included with the VC431)

Accelerometers

The VC431 vibrometer operates with the following triaxial accelerometers :

- AC031 Triaxial accelerometer for the Hand-arm application
- AC032 Triaxial accelerometer for the Buildings/Structure application
- AC033 Triaxial accelerometer for the Whole body application
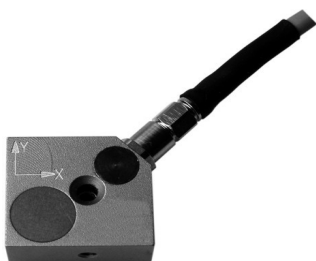
AC031 accelerometer for Hand-arm

Technical Specifications

AC031 (includes cable and accessories)

IEPE triaxial piezoelectric accelerometer (shear design)
Sensitivity: 10 mV/g
Margin of frequencies (10%): 0.4 Hz at 17000 Hz
Operating margin: -20 at 120 ºC
Weight: 14 g (without cable)
Assembly: M3 Thread

AC032 accelerometer for Buildings/ Structure

AC032 (includes cable)

IEPE triaxial piezoelectric accelerometer (shear design)
Sensitivity: 500 mV/g
Margin of frequencies (10%): 0.13 Hz at 4800 Hz
Operating margin: -30 a 90 ºC
Weight: 365 g (without cable)
Assembly: M8 Thread

AC033 (includes cable)

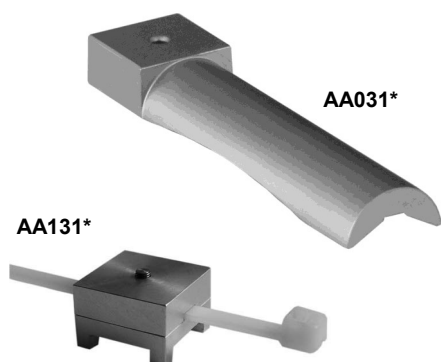IEPE triaxial piezoelectric accelerometer (bending design)
Sensitivity: 100 mV/g
Margin of frequencies (10%): 0.25 Hz at 4000 Hz
Operating margin: -10 at 50 ºC
Weight: 310 g (without cable)
Assembly: On seat or with strap

AC033 accelerometer for Whole body

CV211* Vibration Calibrator

AA031*

AA131*

Handle (AA031) and tool (AA131) adapters for the AC031accelerometer

*Accessories not included with the VC431.

Accessories included with the VC431

FN431	Case
STF030	Computer program
CN1US	USB cable miniature connector—USB
	Two 1,5 volt batteries

Optional accessories

CV211	Vibration calibrator for accelerometers
AA144	Mounting adapter to check the AC033 accelerometer
TR-40	Tripod (height 1,10 m)
TR050	Tripod (height 1,55 m)
ML12	Carrying case (39x32x12 cm)
AM301	Mains power feeder with USB
CP015	1,5V 2600mA battery charger
PB015	1,5V 2600mA rechargeable battery

Accessories included with the AC031 accelerometer

AA031	Handle adapter for the AC031 accelerometer
AA131	Tool adapter for the AC031 accelerometer

Accessories included with the AC032 accelerometer

CN032	Connection cable from the AC032 accelerometer to the VC431 vibrometer

Accessories included with the AC033 accelerometer

AA033	Strap adapter for the AC033 accelerometer

Certificates and regulations

Complies with the following regulations:

- ISO 8041:2005 and ISO 8041:2005/Cor1:2007
- UNE-EN ISO 8041:2006 and UNE-EN ISO 8041:2006 /AC:2009
- $C\!\epsilon$ Mark. Complied with the directive on low voltage 73/23/EEC and directive CEM 89/336/EEC modified by 93/68/EEC
- The **VC431** complies with directives 2002/96/EC and 2003/108/EC on WEEE (Waste Electrical and Electronic Equipment)

Range of linearity

• Hand Arm Application

At reference frequency of (80 Hz): acceleration in m/s^2

	Band-limiting	Wh
Upper limit	3800	767.6
Lower limit	0.038	0.038

• Whole Body Application

At reference frequency of (80 Hz): acceleration in m/s^2

	Band-limiting	Wh	Wk
Upper limit	380	47.918	293.284
Lower limit	0.0038	0.0038	0.0038

• Whole Body in Buildings Application

At reference frequency of (16 kHz): acceleration in m/s^2

	Band-limiting	Wm
Upper limit	76	25.55
Lower limit	0.00076	0.00076

• Structure Application

At reference frequency of (16 kHz): velocity in m/s^2

	Band-limiting
Upper limit	1.07480
Lower limit	0.000010748

Maximum error in frequency measurement: 2%

Total noise inherent in environmental conditions

• Hand Arm Application, with AC031

	Wh
Total noise	0.00365

• Whole Body Application, with AC033

	Wd	Wk
Total noise	0.00191	0.00181

• Whole Body in Buildings Application, with AC032

	Wm
Total noise	0.00012

Frequency weighting

Hand Arm (HA): Wh

Whole Body (WB): Wd, Wk

Whole Body in buildings (WBB): Wm

Accelerometers (not included)

- Hand-arm accelerometer (HA) AC031
- Whole body accelerometer (WB) AC033
- Whole body for buildings (WBB) and structure (S) accelerometer AC032

Parameters

See table | Resolution: >1 %

Influence of humidity

Operating margin (in absence of condensation):   25 a 90   %

Influence of temperature

Operating margin :	-10 a +50	ºC
Maximum error (-10 to +50ºC):	0,5	dB
Power supply without batteries:	-20 a +60	ºC

Electromagnetic compatibility

The equipment complies with the basic specifications of norm 8041 for the required immunity to a.c. power and radio frequency fields .

The equipment shows no degradation nor operational loss after exposure to electrostatic discharges.

Capacity

Has 4 Mbytes memory.

Can store 256 registers in the memory.
Capacity (continual measurement)

Hand-arm:	43:00	hours
Whole Body:	43:00	hours
Whole body in buildings:	19:30	hours

Power

Two 1,5 V batteries, type LR6 size AA.
Typical duration with continuous operation

Hand-arm:	09:30	hours
Whole Body:	11:30	hours
Whole body in buildings:	10:30	hours

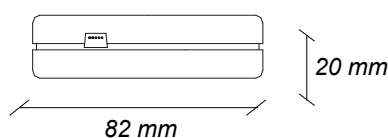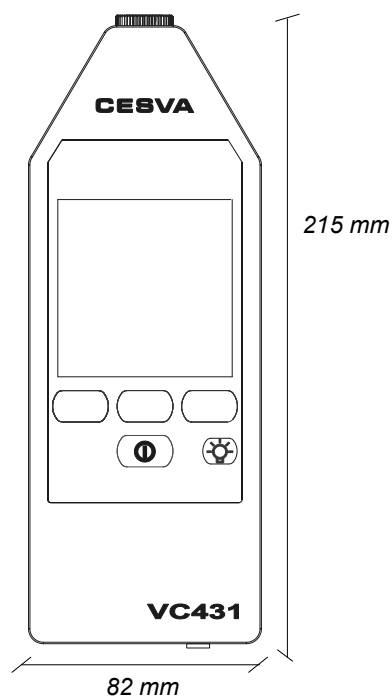*Typical duration with the screen light on may be less*
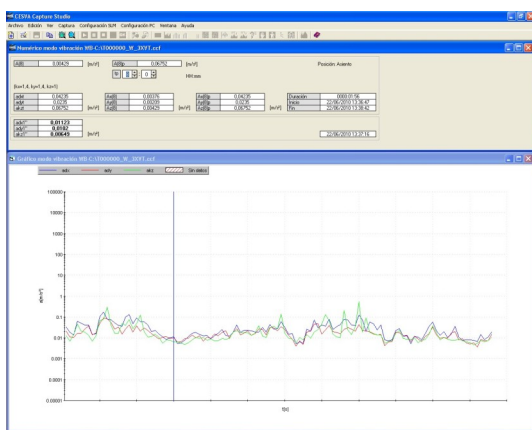
External powering by USB port
Maximum acceptable power : 5 V ± 0,5   (0,5 A)

Dimensions and weight

Dimensions: 215 x 82 x 20 mm
Weight: with battery 450 g ; without battery 400 g

215 mm

82 mm

20 mm

82 mm

Cesva Capture Studio (SFT030)

The following operations can be carried out with the CESVA Capture Studio software supplied with the **VC431**:

- Download the registers stored in the memory of the **VC431**.

- Display the registers of the measurement.

- Recalculate all the parameters referring to a different exposure time t_p.

- Export data and graphs to create the personalised acoustic report (totally compatible with the Windows® environment).
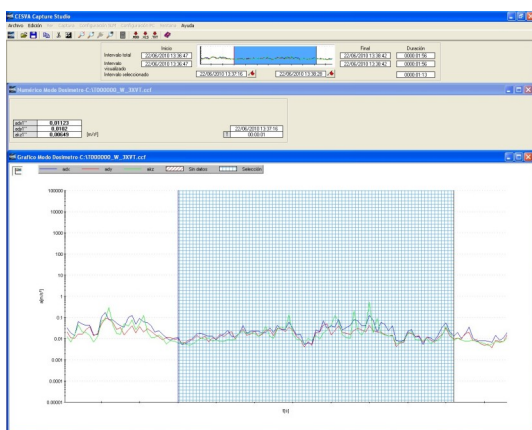
Capture Studio Editor* (CSE)

Capture Studio Editor is the software that enables data acquired by the **VC431** to be edited:

- Delete intervals of the measurement that correspond to mistakes caused by erroneous contributions

- Selection of the most significant periods and recalculation of parameters for the period selected.

- Identification of cycles.

- Selectively export data to *.txt, *.xls, *.mdb formats.

Both programs operate in the Windows 9x/Me/2000/NT/XP/VISTA/7 environment.

*Optional

The characteristics, technical specifications and accessories may vary without notice