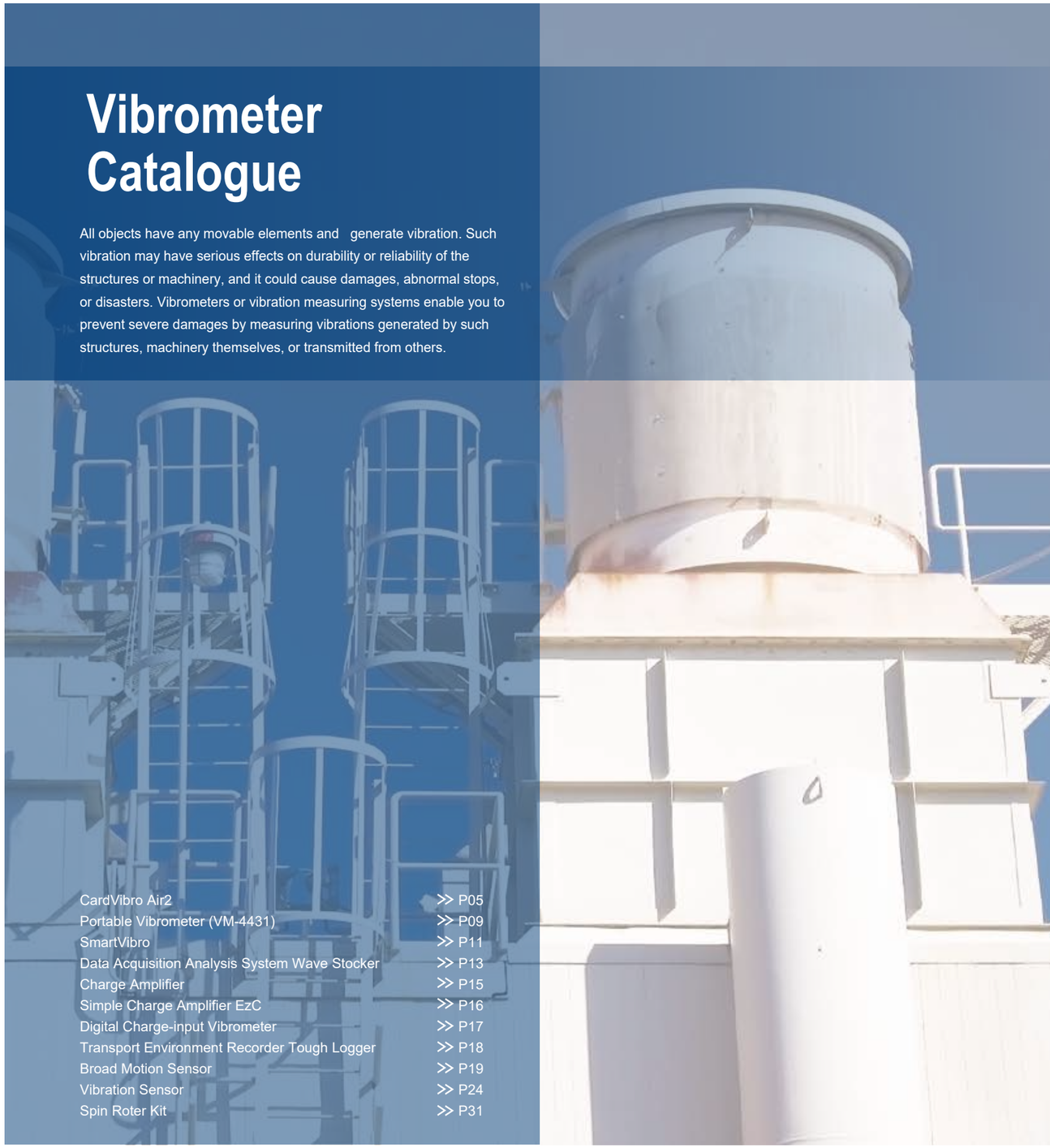
Vibrometer Catalogue

All objects have any movable elements and generate vibration. Such vibration may have serious effects on durability or reliability of the structures or machinery, and it could cause damages, abnormal stops, or disasters. Vibrometers or vibration measuring systems enable you to prevent severe damages by measuring vibrations generated by such structures, machinery themselves, or transmitted from others.



IMV CORPORATION

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August 2022
Cat No.2208②VMG_E

IMV CORPORATION

FIRST choice
for our Partners

Future

IMV works with our customers and investors to secure their future, developing the products, skills and resources that will bring success. IMV appreciates this and work fast to meet our partners' future needs.

Integrity

IMV treats our customers, suppliers and investors with the highest integrity, dealing with all our partners in an open and honest manner. IMV works hard to earn and keep your trust.

Reliability

Our customers use IMV's products to ensure reliability and performance. We build this reliability into all our products and services. IMV will be there when you need us.

Strength

IMV's financial strength means we will be a long-term partner for our customers and are able to invest in the research for new products. IMV has the strength in finances, products and people to serve our customers on a global basis. We have the strength to be the world's number 1 vibration test and measurement company.

Technology

IMV invests substantially in research to understand our customers' needs and the products to meet those needs. IMV has been the first to market many new products and technologies and we will continue to lead the market through technology and innovation for the benefit of our customers and investors.

Secure the future

With our vision "Secure the Future", IMV continues to contribute to safety, comfort, and ecology in society.
Since our establishment in 1957, we have been involving in various fields of technologies. In dealing vibration measurement, we have strengthen our product development and total service to our partners and society. We will be a company to "Secure the Future" with our reliable technology.

Contents

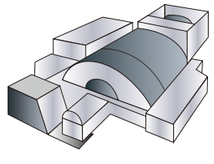
Selection Guide for Vibrometers / Vibration Measuring Systems

	System	CardVibro Air2 P5	Portable Vibrometer P9	SmartVibro -Piezoelectric Type- P11	SmartVibro -Electrodynamic Type- P11	SmartVibro -Piezo-resistive Type- P11	Wave Stocker P13	Charge Amplifier P17	Broad Motion Sensor P19
	Model	VM-2012 VM-2012C	VM-4431	VM-4424H	VM-3024H	VM-7024H	VM-0330/16	VM-1970	VP-8013M
Usability	Portable	○	○	○	○	○	—	—	○
	Measured value storage	○	○	—	—	—	○	—	—
	Multi-point measurement	—	—	—	—	—	○	—	—
	Sending a data to PC	○*	○	○	○	○	○	—	—
	Data analysis	○	—	○	○	○	○	—	—
	Waveform data storage	○	—	○	○	○	○	—	—
	Automatic equipment diagnosis	○*	—	—	—	—	—	—	—
Purpose	Machinery maintenance	○	○	○	○	○	○	○	○
	Vibration measurement of public pollusion	—	—	—	—	—	—	—	—
	Vibration evaluation, analysis	○	—	—	—	—	○	○	○
Object	Motor, Blower, Pump	○	○	○	○	—	○	○	○
	Turbine	○	—	—	○	—	○	○	—
	Generator	○	—	—	○	—	○	○	—
	Mixer, Centrifuge	○	—	—	—	○	○	○	○
	Crane, Bridge	○*	—	—	—	○	○	—	○
	Floor, Ground	○*	—	—	—	○	○	—	○

*Optional application is needed.

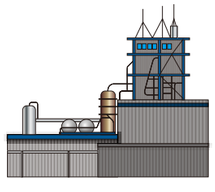
Application examples

■ General machinery

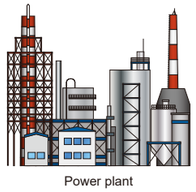


Large motor

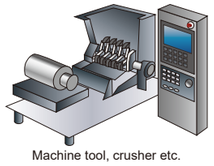
Gas tank



Heavy industry plant

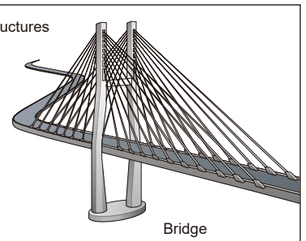


Power plant

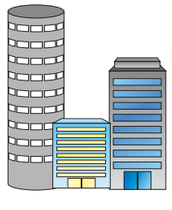


Machine tool, crusher etc.

■ Structures



Bridge



Buildings

How to select vibration measuring systems

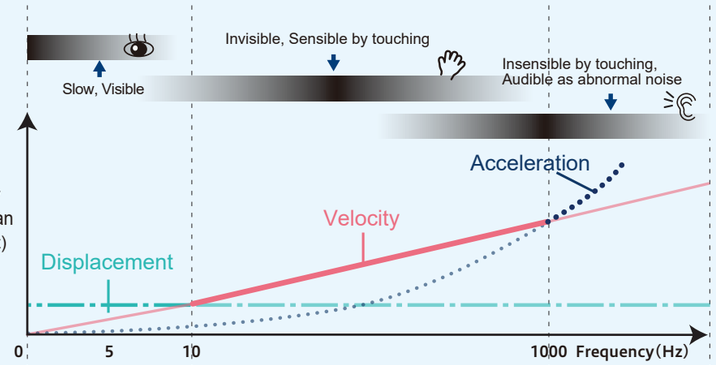
Selection of vibration measuring systems depends on what kind of vibration you measure.
The following is classification of vibration according to human perception.

Perception

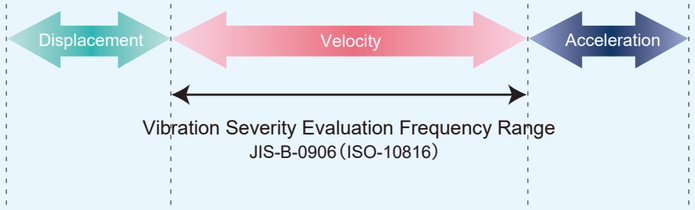
■ Watching
■ Touching
■ Listening

Invisible, Sensible by touching
Slow, Visible
Insensible by touching, Audible as abnormal noise

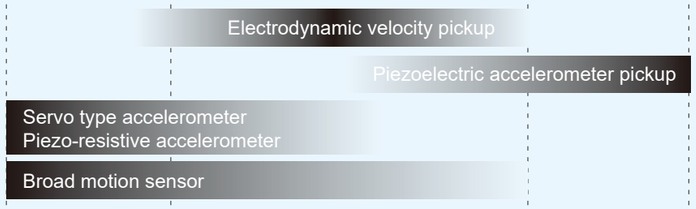
1 Comparison of displacement, velocity and acceleration in human sensitivity. (image chart)



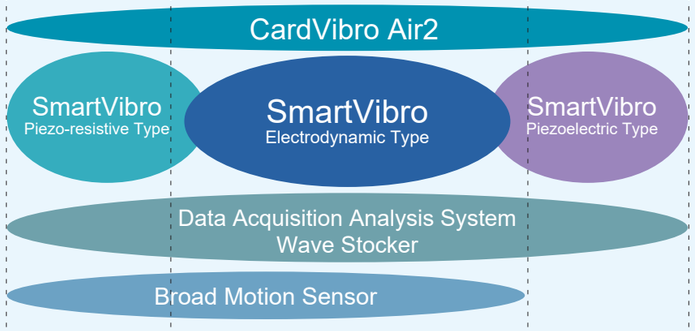
2 The function (displacement, velocity or acceleration) positioned highest on the above graph is most effective for evaluation.



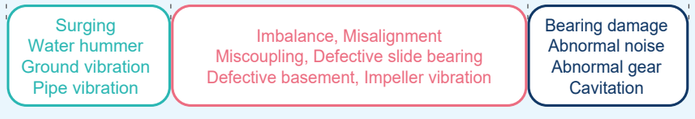
3 Suitable pickup for measurement



4 Suitable equipments



5 Example of measurement purpose



CardVibro Air2

VM-2012 / VM-2012C

The first portable vibrometer communicating by WiFi

Precise measurements are now possible even in environments that gave difficulty on vibration measurements, by high speed communication powerful data processing.
The application (Air2 Light) demanded much has been released making it easier to use.

Features

- Operation with Android tablet PC
- Reliable wireless data communication (WiFi)
- Compact and light weight
- Low power consumption

VM-2012
*Actual size

Functions

Air2 Air2 Light Simultaneous measurement

There are many functions to express characteristics of vibration in general, so conventional vibrometers usually needed to switch the mode every time to measure by each factor. However, on pressing a button, you can measure acceleration, velocity and displacement simultaneously when you use CardVibro Air2 function for simultaneous measurement. It can save operating time and prevent miss-measurements.

Air2 (Tablet screen)

Air2 Light (Smart phone screen)

Air2 Air2 Light Evaluation function

CardVibro Air2 can quickly evaluate the condition of the rotational machinery such as blowers or motors at the site with its customized standard. CardVibro Air2 enables everybody to make same judgements on same machinery conditions, having the judgement functions regarding standard as the Vibration Severity ISO-10816 (JIS-B-0906) and original bearing evaluation means.

Air2 (Tablet screen)

Air2 Light (Smart phone screen)

Air2 FFT analysis

When the measured vibration level is too large, FFT analysis is available to investigate. CardVibro Air2 has a high resolution analysis function of 12800 lines. Comparison of bearing vibration is possible on frequency components.

Air2 (Tablet screen)

Air2 Data saving

All acquired data can be saved. Using the data management software*, highly efficient management is possible on the transferred data from PC.(*option)

Air2 (Tablet screen)

Air2 Air2 Light USB cable connection

Even if wireless connection is not available, measurements by USB cable connection to tablet PC are available.

Air2 (Tablet screen)

Air2 Light (Smart phone screen)

Air2 Waveform observation

Beat phenomena or scrathes on bearings give some features on the vibration waveforms. It allows easy recognition of faults by waveform or graph observation. Maximum 30 minute* waveform can be recorded.
*Depends on a condition

Air2 (Tablet screen)

Air2 Continuous monitoring function

Waveforms or FFT results are monitored almost in real time.

Air2 (Tablet screen)

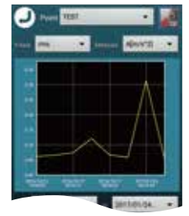
Air2 Route setting function

If the measurement point and order are specified in advance, the data will be displayed in the order. Data management is possible by machine name, measurement point, or registration number.
*Data management software (option) is needed.

Air2 (Tablet screen)

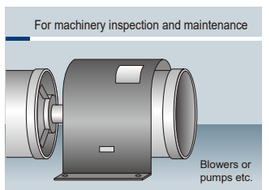
Air2 Light Trend graph function

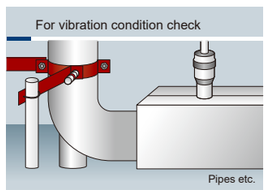
The trend graph which needed conventionally data management software now can be displayed solely by Air2 Light without using such software. Furthermore, such data can be saved by CSV to be attached to e-mail.

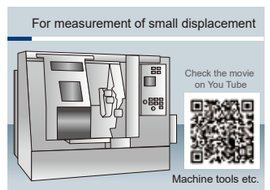


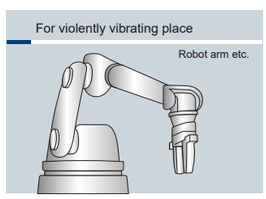
Air2 Light (Smart phone screen)

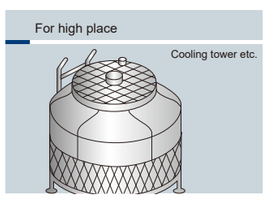
Application examples

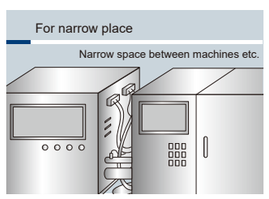


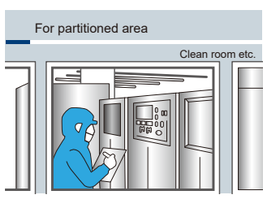












High speed signal communication with WiFi

Remote control is possible
by wireless WiFi communication.

Waveform display screen
*Tablet PC is not included
in the accessories.

Continuous 6 hour operation with 2AAA batteries

*Only rechargeable battery

Rechargeable with USB connection

3 types of measuring method

Direct measurement

By pressing a dedicated sensor probe (standard composition) , vibration is easy to be measured directly, and no need to worry about a cable pulled into a rotating machine.

Hands-free measurement

A piece of magnet base makes possible to measure without using hands.
*small magnet is optional.

Measurement via USB cable

Measurement is stable even when WIFI signal is weak.
* Use of USB plug bracket (option) is recommended for stable measurement.

New function table comparing with conventional application

Terminal software function	Function detail	Air2	Air2 Light
OA value measurement	Simultaneous measurement and indication of acceleration, velocity and displacement is available	○	○
Judgement function	Judge “Good” or “Bad” at the measuring spot instantly	○	○
FFT/waveform analysis	Vibration phenomenon is analyzed from frequency analysis or waveform observation	○	—
Monitoring function	Continuous display of vibration waveform like an electrocardiogram	○	—
CSV data saving	Data are saved in the terminal PC in Excel format	—	○
Trend graph	Measurement value is displayed in time series	—	○
Communication with optional software	Connection to data management software or equipment diagnosis software	○	—

Specifications

Common specifications

Item	Specification
Interface	Wireless LAN: IEEE802.11b, Compliant to WiFi, 128bit WEP, WPA/WPA2
Wireless communication mode	Infrastructure mode
Built-in memory capacity	4Mbit × 16bank
Power supply	2 pcs. of AAA battery
Current requirement	During measurement (at the time of WiFi use): approx. 150 mA
Operational temperature range	+5 ℃ to 50 ℃ (Guaranteed by attached battery only)
Operational humidity range	30 to 90% (Non-condensing)
Sampling frequency	Maximum 76.8 kHz
AD resolution	16 bit
Tablet OS	Android 7.0 or later *Only approved by IMV *Refer to IMV website for the latest recommended tablet information. https://www.imv.co.jp/products/vibrograph/measure/air2/

Standard composition

Air2 main unit

USB AC adaptor

Micro USB cable

AAA NiMH battery

Only for standard type

Probe for sensor

Dedicated software “CardVibro Air2” and “CardVibro Air2 Light” are available downloaded from Google Play.
*Please prepare your own Tablet PC.

Input “Card Vibro Air2” and search

Select “Card Vibro Air2”

*Tablet PC is needed for measurement.
(Not included in the standard composition)

CardVibro Air2
Standard Type (Bult-in sensor)
VM-2012

Item	Specification
Mass	Approx.145 g
Size	41.5 mm (D) × 40.5 mm (W) × 88.6 mm (H)
Sensor	Piezoelectric accelerometer
Acceleration frequency range	10 to 10000 Hz
Velocity frequency range	10 to 1000 Hz
Displacement frequency range	10 to 150 Hz
Maximum measurement acceleration	500 m/s²

CardVibro Air2
Connector Type
(External sensor)
VM-2012C

*Connector type needs to connect with an optional sensor.

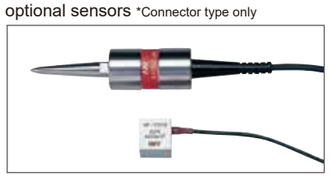
Item	Specification
Mass	Approx.130 g (excluding a sensor)
Size	41.5 mm (D) × 40.5 mm (W) × 88 mm (H)
Connecting sensor	Voltage output sensor, ICP sensor
Voltage output port	-5 V, +5 V
ICP port	+ 24 V (2 mA)
Voltage input port	± 2.5 V
Sensor input IF	HR10 A (round type pin 6)

Option

	Standard type	Connector type
Data management software DB-2012 For data management on PC	●	●
Equipment diagnosis software DS-2013Tr To diagnosis abnormality such as imbalance or misalignment	●	●
Carrying case B-2012 To store Air2 main unit and other compositions as tablet PC	●	●
Strong magnet MH-202R To fix the sensor to a measurement spot	●	—
Strong magnet (for spherical surface) MH-203R Recommended To fix the sensor to a spherical surface such as pipes	●	—
Long probe PI-2001 In case of use a long sensor probe(length 185mm)	●	—
Long cable 3 m CE-2012- 3m, 10 m CE-2012-10m In case of extending the sensor cable. Suitable for all input sensors.	—	●
Piezoelectric accelerometer VP-2012A Accelerometer for connector type	—	●
Low frequency vibration measurement sensor VP-2012PS1 For low frequency vibration measurement (3 to 100 Hz). Fixed by double-sided tape on the spot. (Piezo-resistive type, cable extension 2.5 m)	—	●
Charge amplifier CA-2012 Use for general purpose piezoelectric accelerometers. BNC input connector, low noise cable between sensor and CA-2012 is additionally needed.	—	●
Sensor input cable CC-2012I For build-in pre-amplifier sensor connection	—	●
Sensor input cable CC-2012V For voltage input	—	●

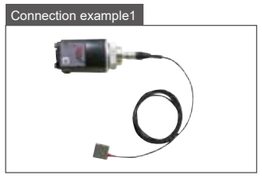
*Please contact us if you like to use your own optional product.

Connector type is of common to the optional sensors *Connector type only



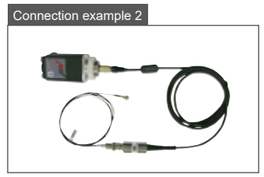
Connector type is of common to the piezoelectric accelerometer and low frequency vibration measurement sensor. *Optional product

Connection example1



*Connection example with low frequency vibration measurement sensor (VP-2012PS1)

Connection example 2



*Connection example with charge amplifier (CA-2012) and small sensor (VP-02S)

Portable Vibrometer

VM-4431

The easy analysis function has been equipped.

The criteria is based on "ISO standard 10816-3: 2009" describes the absolute value judgment by velocity rms.

Features

- Easy-to-read color large screen
- Equipped with ISO standard analysis function
- Easy to manage with save function and dedicated software

Compact

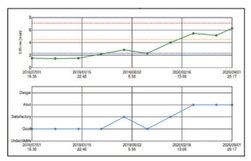
Carry in one hand (Smartphone-size)

Easy

All you need is just install the sensor and push the start button. Big buttons that are easy to press even with gloves on and a large screen that is easy to see even in the dark improve operability. The rear magnet helps you measuring and Φ3.5 mm jack is able you to auscultate machines like stethoscopes.

Data viewer station

We offers a free software that is designed to manage stored data. It is available in our website.



ISO vibration severity

The icons of "Good", "Satisfactory", "Alert" and "Danger" make it easy for beginners to understand the criteria.

What is "Vibration severity measurement instrument on the requirements 10816-3: 2009" ?

This standard is widely used for analysis of rotational machinery. The current ISO standard 10816-3: 009 describes the absolute value judgment by velocity rms.

▶▶ Please see page 35 for details.

What can we know?

In addition to the judgment function, the portable vibrometer can measure four vibration values. By paying close attention to each value, you can determine what kind of abnormal phenomenon is occurring.

Bearing scratches, noise, gear abnormalities, cavitation, etc.
→**Envelope acceleration** and **acceleration** values increase

Unbalance, misalignment, coupling failure, the slide bearing failure, foundation failure, impeller vibration, etc.
→**Velocity** values increase

Surging, water hammer, ground vibration, pulsation of the pipe
→**Displacement** values increase

Application examples

Motor

Machine tool

Specifications

Item		Specification
Frequency range	Acceleration	5 to 10 kHz
	Velocity	10 to1000 Hz
	Displacement	10 to1000 Hz
Measurement mode	Acceleration	RMS, EQ PEAK
	Velocity	RMS, EQ PEAK
	Displacement	EQ PEAK, EQ P-P, RMS
	Envelope function	
Judgment function	ISO Vibration severity judgment (ISO 2954: 2012)	
Internal memory	Flash memory 16 GB	
Display	TFT color LCD	
Notification	Battery level, memory level, Vibration value, clock	
Output interfaces	Φ3.5 mini-jack (vibration waveform output)/USB Type-C (date transfer)	
Power supply	AA 2 batteries, USB bus power	
Dimension	130 (H) × 67 (W) × 28 (D) mm	
Weight	Approx. 230 g (Including batteries)	
Ambient operating conditions	-10 to + 50˚C 90% RH or less	
Certification	CE mark (EMC directive)	

Standard composition

• Main unit VM-4431

• Accelerometer
VP-100
(with 1.5m cable)

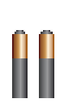
• Magnet
HS-AM001

• Probe
TVM-4-B371

• Rubber jacket
MDR-IM1913-009

• USB cable

• Output cable
TVE-4-8100B



• AA battery

• Instruction manual
TVE-6-4168

• Carrying case
TEKNO 2007S

Optional Accessories

• AC adapte
UBX305-0510r

• Short probe
TVM-4-B372

• Wall hanging magnet
A16

SmartVibro

VM-4424H
VM-3024H
VM-7024H

Accurate and easy operation

Compact and multi-functional portable vibrometer in low price.
The value of acceleration, velocity and displacement are simultaneously indicated on the touch panel display.

Features

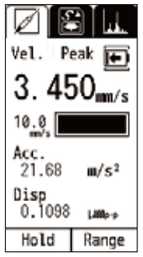
- Simultaneous measurement of acceleration,
- velocity and displacement
- Measurement of PEAK, RMS and EQP
- FFT analysis
- Waveform data is saved into MMC or compatible card.

VM-3024H
*Rubber jacket is available as an option

Functions

Simultaneous measurement

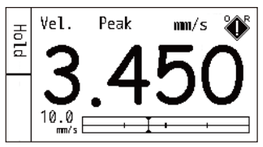
There are many functions to express characteristics of vibration, so conventional vibrometers usually needed to switch the mode every time to measure by each factor. However, on pressing a button, you can measure acceleration, velocity and displacement simultaneously when you use SmartVibro function for simultaneous measurement. It can save operating time and prevent miss-measurements. By switching the screen, VM4424H can confirm acceleration envelope for bearing condition to find even small defects easily.



Simultaneous measurement screen

Touch panel LCD

Easy operation for setting and selecting measurement value on the display with touch panel is possible. Moreover, SmartVibro has more functions such as adjustment of brightness of contrast of the backlight, zooming measured value which will help you for easy measurement in various cases.

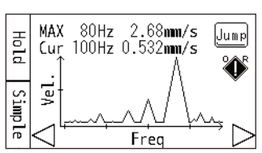


OA screen (display of velocity value)

FFT analysis function

SmartVibro is possible to perform frequency analysis by the minimum condition setting. *See the specifications on page 13

*What is FFT analysis?
FFT analysis is to extract frequency components from vibration waveform. By comparing frequency component distribution, the cause investigation becomes possible.

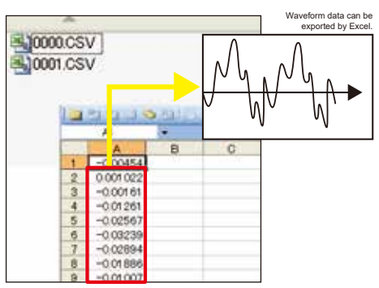


FFT screen

Waveform data save function*

Can be saved into MMC or compatible card as CSV format.
(Maximum 50 seconds*) *In case of VM-7024H.
See the specifications on page 13 for maximum memory storage time.

[MMC or compatible card]
Memory capacity is 2GB. About 1000 files can be saved
(1 file data for 5 seconds).



CSV import screen

Two languages are available

Japanese and English are selectable by setting change only.

Application examples

Pump

Compressor

Specifications

Sensor type		Piezoelectric Type	Electro-dynamic Type	Piezo-resistive Type
Image picture		Supports a wide frequency range 	Supports small displacement measurement 	Suitable for low frequency 
Model		VM-4424H	VM-3024H	VM-7024H
		High-end	High-end	High-end
Frequency range	Accereration	5 Hz to 10 kHz	10 Hz to 1kHz	0.3 Hz to 100 Hz
	Velocity	10 Hz to 1kHz	10 Hz to 1kHz	3 Hz to 100 Hz
	Displacement	10 Hz to 150 Hz	10 Hz to 1kHz	3 Hz to 100 Hz
Maximum mesurable range	Accereration	300 m/s² (RMS, EQP, PEAK)	100 m/s² (RMS, EQP, PEAK)	20 m/s² (RMS, EQP, PEAK)
	Velocity	1000 mm/s (RMS, EQP, PEAK)	200 mm/s (RMS, EQP, PEAK)	100 mm/s (RMS, EQP, PEAK)
	Displacement	10 mmp-p (EQP, PEAK)	1,000 µmp-p (EQP, PEAK)	10 mmp-p (EQP, PEAK)
FFTfunction		Equipped	Equipped	Equipped
Waveform save function		Equipped	Equipped	Equipped
Power supply		AA battery × 2 pcs. (Continuous use for 20 hours or more)	AA battery × 2 pcs. (Continuous use for 20 hours or more)	AA battery × 2 pcs. (Continuous use for 20 hours or more)
Weight		Approx. 230 g (including battery)	Approx. 230 g (including battery)	Approx. 230 g (including battery)
Size		74 (W) × 32.5 (D) × 154 (H) mm	74 (W) × 32.5 (D) × 158 (H) mm	74 (W) × 32.5 (D) × 154 (H) mm
Sensor size/weight		Piezoelectric sensor (VP-4316) φ19 × 42 (L) mm/40 g (Sensor) φ 6 × 195 (L) mm/70 g (probe)	Electrodynamic velocity sensor (VP-3024) φ 25 × 50 (L) mm/140 g (Sensor) φ 10 × 50 (L) mm/20 g (probe)	Piezo-resistive accelerometer (VP-7000L) 45 (W) × 45 (D) × 45 (H) mm/200 g (Sensor)
Common accessories		• I/O cable For utilizing AC/DC output 	• AA battery × 2 pcs. 	• SD card Save waveform data in CSV format 

Option	• Strong magnet【for flat surface】 MH-202R (φ24 × 10.5 mm) 	• Strong magnet【for spherical surface】 MH-203R (φ24 × 20 mm) 	• Magnet MB-PB 50 (W) × 60 (D)× 65 (H) mm 
	• Long cable LC4 (4 m) For measurement with a long sensor cable 	• Extention cable CE-3024-3 (3 m) CE-3024-6 (6 m) CE-3024-10 (10 m) For measurement with a long sensor cable 	• Long cable CE-7000 (10 m) For measurement with a long sensor cable 
Common option	• Rubber jacket PC-3024 Reduces the impact on the main body 	• AC adapter PS-3024-3 For measurement with AC power instead of batteries 	• Carrying case C-3024 Stores the main unit and options 

Data Acquisition Analysis System
Wave Stocker
VM-0330/16

For waveform data acquisition and analysis

By simultaneous sampling measurement of up to 16 channels, data collection and judgement is possible. It can be widely used for site measurement, monitoring and developmental study.

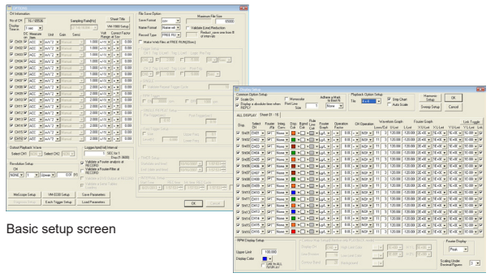
Features

- Compact and light weight
- Data transfer by USB 2.0
- Easy to operate
- Long term continuous data acquisition is possible

Functions

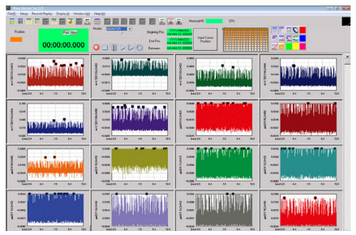
Waveform acquisition

Waveforms of up to 16 channels are displayed and data observation (as waveform only, FFT only, waveform plus FFT) is possible during measurement is proceeding.
You can operate various setup, halt and stop etc. instinctively just like a home video recorder.

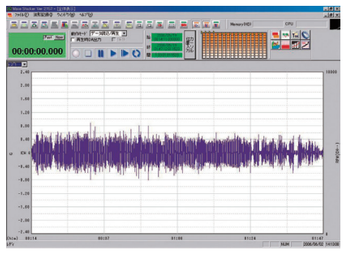


Basic setup screen

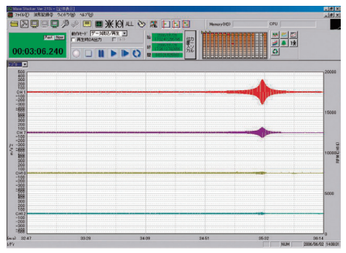
Display setup screen



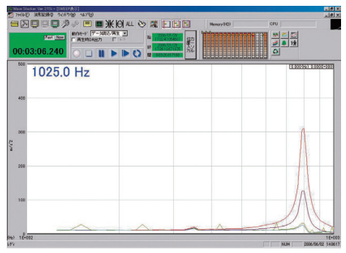
Analysis screen



Transportation vibration time history waveform screen



Swept original wave forms screen



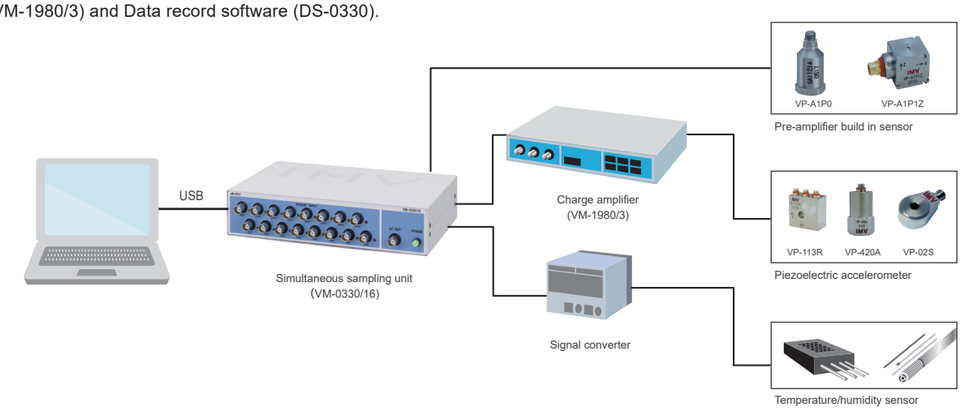
Resonance graph screen

Analysis function

Data is saved as text files after various analysis such as inter-channel calculation, filtering, waveform edit, FFT (spectrum) analysis, differentiation, integration, and DC removal etc.
The data is available with the commercialized software as Excel.

System Composition

Data aquisition and analysis system (Wave Stocker) is composed of Simultaneous sampling unit (VM-0330R/16), Charge amplifier (VM-1980/3) and Data record software (DS-0330).

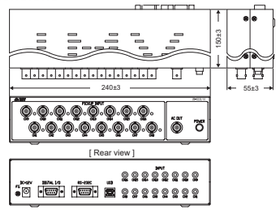


Specifications

16 Channel simultaneous sampling unit VM-0330/16

Item	Specification
Analog input function	Voltage: ±10 V Input combination: DC/AC (0.07 Hz) Constant current: 3 mA on-off possible (for amplifier build-in sensor)
A/D converter function	Sampling frequency: 12.8 kHz/ch (maximum) Resolution: 24 bit
Amplifier function	×1, ×5, ×10, ×20, ×50, ×100
Alarm indication function	Over range light-on (HOLD)
Digital input/output function	2 inputs, 2 outputs,
Power supply	DC12 V (dedicated AC adapter)
Operating temperature range	0 to +50 ℃
Operating humidity range	20 to 80% RH (non-condensing)
Size/Mass	240 (W) × 150 (D) × 55 (H) mm/1.6 kg

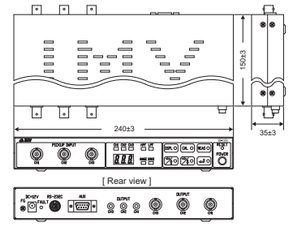
Outward Dimensions



Charge amplifier VM-1980/3

Item	Specification
Input signal	Piezoelectric accelerometer
Frequency range	0.4 to 20 kHz
Charge sensitivity setting range	0.01 to 999 pC/(m/s^2)
Measurement range	3.3 to 66000 m/s^2 (for charge sensitivity 1.5 pC/(m/s^2) *Subjected to change by charge sensitivity
Filter frequency characteristics	Low frequency cut-off: hrough, 3 Hz, 10 Hz (-18 dB/Oct) High frequency cut-off: Through, 1 kHz, 10 kHz (-18 dB/Oct)
Calibration signal	156 Hz, ± 2.5 V Sine output
Alarm indication function	Over range: Red LED light-on (HOLD) Under range: Green LED on/off (1 second HOLD)
Power supply	DC12 V (dedicated AC adapter)
Operating temperature range	0 to +50 ℃
Operating humidity range	20 to 80% RH (non-condensing)
Size/Mass	240 (W) × 150 (D) × 35 (H) mm/0.6 kg

Outward Dimensions



Software DS-0330

Analysis Tool	Function
Analysis 000 Data Recording Tool (standard) Concept This is a data saving tool to make a pre-processing as filing the simultanous sampling data from 16 ch A/D unit, waveform monitoring, regeneration, data extraction for analysis. It is also possible to monitor the original waveforms or FFT analysis in real time of 16 channels. This is an essential item to use other analysis tools.	・Acquisition of 16ch. sampling output ・Filter processor (FIR) ・Triggering ・Averaging ・Weighing of filtering ・Text file output ・Waveform monitoring ・Data recording ・Logger record ・Filter property setting ・Printing ・Analysis line number ・FFT real time monitoring ・Window functions ・Data saving ・Data display between cursors ・ME'scope record mode (Coherency, Transfer functions)

Optional software

Analysis Tool	Function
Data extract software	・Continuous recording data extraction ・Power spectrum density (PSD) analysis

*The optional software converts and analyzes the waveform CSV file of Analysis 000.

Charge amplifier

VM-1980/3

Compact 3 signal route charge amplifier

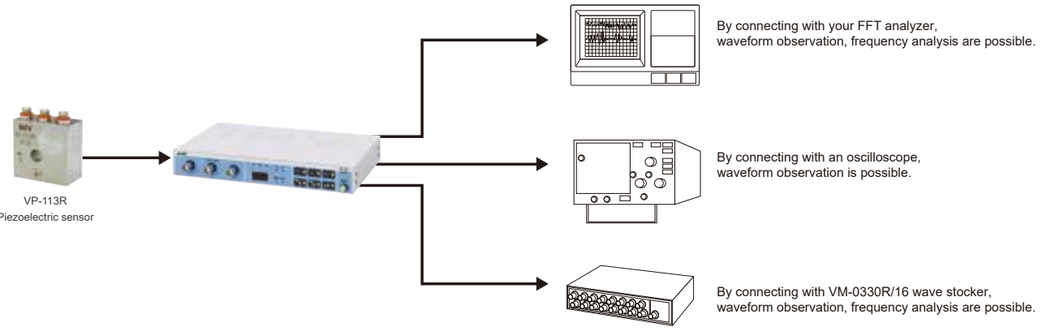
By connecting with piezoelectric accelerometer, it can output acceleration waveform in voltage.

Features

- Compact and light weight
- Desk top or portable use
- Usable as charge amplifier for vibration analysis system (wavestocker).

System composition

■ AC OUTPUT (±5 V at full scale)　Waveform output to oscilloscope, stroboscope and data recorder etc.



Specifications

Item	Specification
Input signal	Piezoelectric accelerometer
Frequency range	0.4 to 20 kHz
Charge sensitivity setting range	0.01 to 999 pC/(m/s^2)
Measurement range	3.3 to 66000 m/s^2 (for charge sensitivity 1.5 pC / (m/s^2) *Subjected to change by charge sensitivity
Filter response	Low frequency cut-off : Through, 3 Hz, 10 Hz (-18 dB / Oct) High frequency cut-off : Through, 1 kHz, 10 kHz (-18 dB / Oct)
Calibration signal	156 Hz,± 2.5 V　Sine output
Alarm indication	Over range : Red LED light-on (HOLD) Under range : Green LED on / off (1 second HOLD)
Power supply	DC12V (dedicated AC adapter)
Operational temperature / humidity range	0 to +50 ˚C / 20 to 80 %RH (non-condensing)
Size / Mass	240 (W) x 150 (D) x 35 (H) mm / 0.6 kg

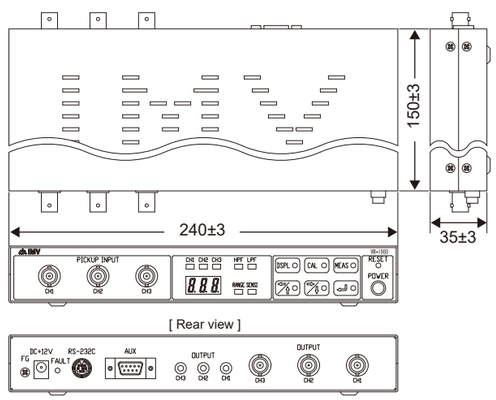
Standard composition

Item	Quantity	Notes
3-channel charge amplifier	1	——
Power supply adapter	1	AC100 V　50 / 60 Hz　41 VA
Instruction manual	1	Inspection certificate is attached on the last page

Option

Item	Notes
RS-232C cable	RS-232C communication cable (sensitivity, range, HPF, LPH can be set up by PC)
Pin jack output cable 0.3 m	Single lead shield wire, Monaural pin jack-BNC
BNC output cable 1.5 m	BNC-BNC cable 1.5 m (RG-58AU)
Connection cable	For connection to 2 or more VM-1980

Outward Dimensions



Simple charge amplifier EzC

CA-3021

Low-cost 1ch charge amplifier

Connect output of charge piezoelectric accelerometer to the logger or oscilloscope.

Features

- Stable charge conversion characteristics
- Power supply with microUSB
- Ultra-smaii in size and light weight
- Simple design without setting

System composition

■ AC OUTPUT (±5 V at full scale) Waveform output to logger, oscilloscope and measurement device etc.

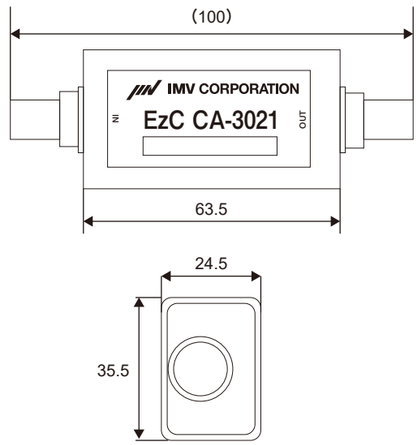
Specifications

Item	Specification
Channel	1 Ch
Sensitivity	1 mV/pC
Sensitivity error	±3 % (160 Hz standard)
Frequency range	5 Hz to 10,000 Hz ± 0.5 dB
Maximum output voltage	- 4.8 V to + 4.8 V
Power supply	+ 5 VDC
Operational temperature range	0 ˚C to 60 ˚C (non-condensing)
Size	63.5 (W) x 24.5 (H) x 35.5 (D) mm (excluding connectors etc.)
Mass	Approx.100 g

Standard composition

Item	Quantity	Notes
Simple charge amplifier	1	——
USB output AC adopter	1	Power supply for simple charge amplifier
Micro USB cable	1	Power supply for simple charge amplifier
Dedicated case	1	Storage for simple charge amplifier

Outward Dimensions



Digital Charge-input Vibrometer

VM-1970

Covers from 1 Hz up to 100 kHz

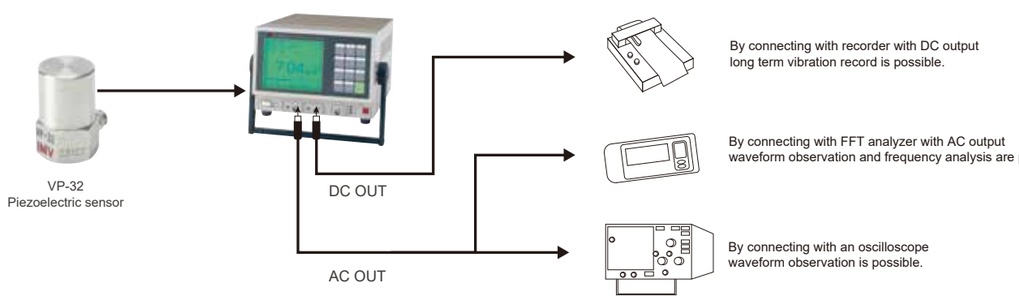
Conversion of the measured value or change of unit are automatic. No need for complicated operations and easy to read indication.

Features

- H function is measurable
- Level alarm function
- Vibration severity calculation according to ISO-10816 is available.

System composition

■AC OUTPUT (±5 V at full scale, load 10 kΩ or higher)　Waveform output to oscilloscope, stroboscope and data recorder etc.
■DC OUTPUT (±5 V at full scale, load 10 kΩ or higher)　Vibration lebel output to pen recorder



Specifications

Item	Specification
Input signal	Piezoelectric accelerometer
Frequency range	Acceleration : 1 Hz to 100 kHz (±3 dB), 3 Hz to 70 kHz (±0.5 dB) Velocity : 3 Hz to 6 kHz (±0.5 dB) Displacement : 3 Hz to 600 Hz (±0.5 dB)
Measurement range (for an accelerometer of charge sensitivity 1.0–9.99pc / m/s²)	Acceleration: 1, 10, 100, 1000, 10000 m/s² 5 range Velocity: 3 Hz to 1, 10, 100, 1000 cm/s 4 range; 10 Hz to 1, 10, 100, 1000 cm/s 4 range; 30 Hz to 0.1, 1, 10, 100, 1000 cm/s 5 range Displacement: 3 Hz to 1, 10, 100, 1000 mmp-p 4 range; 10 Hz to 0.1, 1, 10, 100, 1000 mmp-p 5 range; 30 Hz to 0.01, 0.1, 1, 10, 100 mmp-p 5 range H function: Value of acceleration detected after passing 2 kHz to 15 kHz bandpass filter then detected and processed by 1 kHz low pass filter. Unit is the same as of acceleration.
Filter response	Lower cutoff frequency: Off (1 Hz), 3, 10, 30 Hz Higher cutoff frequency: 300Hz, 1, 3, 10 k, Off (100 kHz) Cutoff: -18 dB Butterworth
Indication	rms: Mean square value　PEAK: Peak value EQP: Equivalent peak estimated from average value　P-HOLD: Held max. peak value
Level watching function	Alarm level step: 1 Step for every channel　Alarm output: 1a Relay contact output / ITTL level output for each individual channel Setting: 0 to 110% for every range　Contact capacity: DC30 V 0.5 A, AC120 V 0.5 A
Output	Waveform: voltage 0 to ±5 V (load 10 kΩ or higher) calibration output: 80 Hz Sine output Level output: voltage 0 to ±5 V (load 10 kΩ or higher)
Operating temperature/humidity	0 to +40˚C/85% RH or lower (non-condensing)
Power supply	Commercial power supply: AC100 V ±15%　50/60 Hz　20 VA or less Battery: D size 4 pcs. life 10 hours or longer External DC power supply: DC9 to 12 V
Size/Mass	200 (W) x 290 (D) x 150 (H) mm (excluding connectors etc.) /Approx. 5 kg

Standard composition

Item	Quantity	Notes
AC adapter	1	For AC 100 V
AC adapter plug	1	Accessory for AC adapter
Output cable	1	1.5 m
Screw driver	1	Flathead screwdriver
Fuse	2	2 A
Main unit plastic cover	1	——
Instruction manual	2	——

Option

Item	Notes
Auxiliary output connector	For alarm relay
Conversion transformer	For AC adapter

Transport Environment Recorder Tough Logger

TR-1000

For investigation and evaluation of the transportation route

For further investigation of the cause of defects by shock, fall, temperature or humidity. For evaluation of vibration durability. For research & development of the most suitable package.

Features

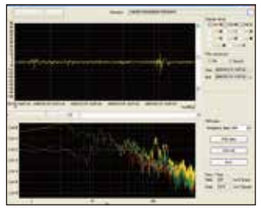
- Built in 3-axis vibration pickup and thermo hygrometer
- All channel are of simultaneous sampling
- Data are easily transferred by USB
- Continuous measurement time is maximum 4 days *depends on the condition

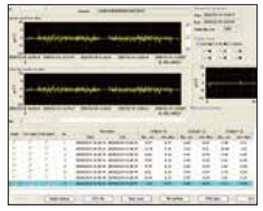
Function

Grasp of transport environment

Able to investigate and evaluate of the transportation route by measuring vibration, temperature and humidity on the overall route. Waveform can be measured continuously and display or PSD analysis is available by using the attached software "Waveviewer".


Setting screen


Vibration waveform and PSD analysis screen


Data edit screen(Optional software)


PSD analysis screen (Optional software)

Specifications

Item	Specification
Measurement mode	Vibration (built-in 3 ch + external connection 6 ch), temperature / humidity
Measurement range	100, 500, 1000 m/s²
Sampling rate	512, 1280, 2560 Hz
Operating temperature range	-25 to +70˚C
Operating humidity range	5 to 95% RH (non-condensing)
Measurement position	Latitude/longitude/Speed (option)
Recording interval	1 to 100 min. (changeable step 1 min.)
Storage capacity	Standard 8 GB (maximum 32 GB)*
Data acquisition	Continuous recording, event recording
Memory (storage medium)	MMC or compatible card
Continuous measurement time	Maximum 30 days *depends on the condition
Power supply (built-in battery)	Rechargeable lithium ion battery× 2 pcs.
External power supply	External battery (option) / Car cigarette lighter socket (option)
Size/Mass	140 (W) x112 (D) x71 (H) mm (excluding connectors etc.) / Approx. 1.5 kg (including battery)

* No recommended memory card for 32 GB

Software

Item	Function
Attached software	Wave Viewer (waveform display, power spectrum density (PSD) analysis) GPS* (Position data CSV format output, NMEA basis file, Option)
Optional software	Data extract software (continuous recording data extraction, power spectrum density (PSD) analysis)
Recommended system requirement	OS: Windows 2000/XP/Vista/7 (32bit, 64bit) CPU: Pentium4 (1 GHz) or more *2 GHz or more is recommended Memory: 1 GB or more

*Position data & map display software Obunsha Corporation" Super Mapple Degital

Broad Motion Sensor

VP-8013/VP-8013S

Covers from ultra low acceleration up to high frequency mechanical vibration.

Broad motion sensor, VP-8013, with the use of an original sensor module developed by IMV is enabled to measure and monitor vibration in wide frequency range which was not covered by single sensor of any conventional types.

Features

- Covers from ultra low acceleration (0.04 Hz)* up to high frequency mechanical vibration (1000 Hz)
- compact design with three axis detection
- Shock durability 10000 m/s^2
- The power supply unit has Micro USB connector

*Actually the output starts from DC, performance confirmed range is from 0.04 Hz.

Functions

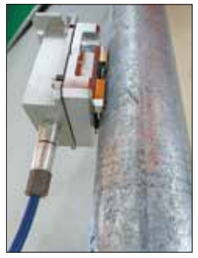
Wide frequency range

There are many different types of vibration ranging from ground or building vibration to machinery vibration. That's why it is necessary to select the best suited sensor for your specific measuring purpose. Particularly, high price servo sensor has been mainly used for low frequency vibration, and piezo accelerometer or electrodynamic sensor usually used in measurement of or machinery vibration are hard to be applied for low frequency measurement. Broad motion sensor, VP-8013, with the use of an original sensor module developed by IMV is enabled to measure and monitor vibration in wide frequency range which was not covered by single sensor of any conventional types.

Low frequency

Able to measure the visible vibration or fluctuation with high accuracy.

Steel tower



Pipe

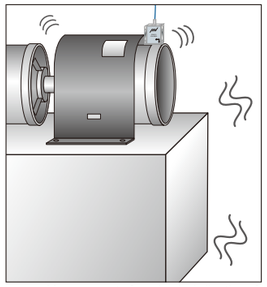
Micro vibration

Able to measure the micro vibration which is usually measured by servo sensor.

Machine tool

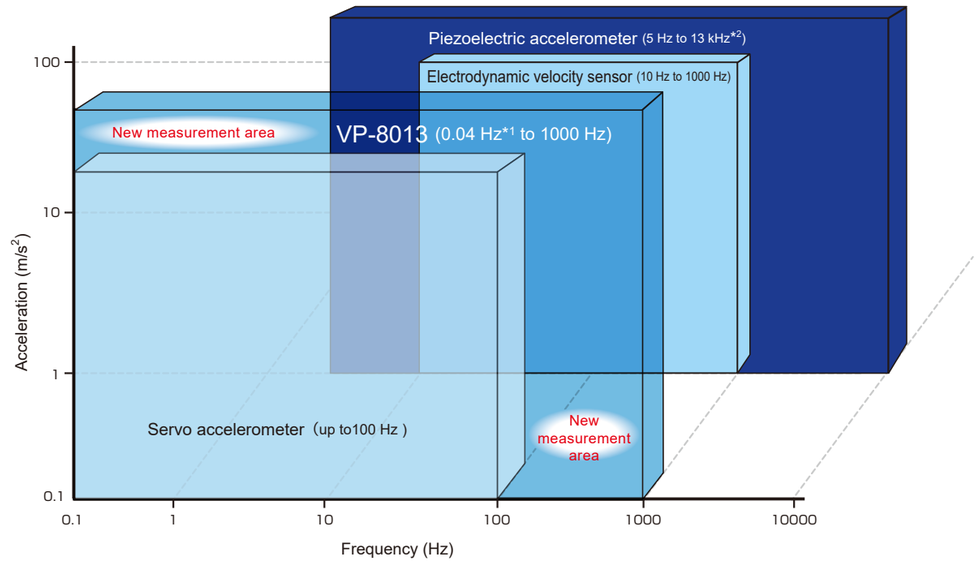
Mechanical vibration

Able to cover the frequency 10 to 1000 Hz, stated by ISO-10816-1 "Mechanical vibration -- Evaluation of machine vibration by measurements on non-rotating parts - General guidelines"
*ISO-10816-1 is widely used for vibration measurement and evaluation of rotating machine over 600 rpm.
Further, the sensor can measure not only the low frequency vibration of a slow rotational machinery as a mixer, but also be used for total vibration evaluation of building, basement and the machine itself.



Measurement of mechanical vibration of motor and its frame (image view)

Measurement area



*1 : Actually the output starts from DC, performance confirmed range is from 0.04 Hz to 1000 Hz .
*2 : In case of IMV product

VP-8013S is suitable for more micro vibration measurement

Specifications

Item	VP-8013	VP-8013S
Measurement direction	3 axis	
Measurement frequency range	0.04 to 1000 Hz	
Maximum acceleration	±58.8 m/s^2	±19.6 m/s^2
Tilt resolution	0.05 degree	
Sensitivity	44.9 mV / (m/s^2)	134.6 mV / (m/s^2)
Sensitivity error	±10 %*	
Cross-axis sensitivity	Less than ±2 %*	
Output noise	X Y : 0.00294 (m/s^2) / √Hz level, Z : 0.0049 (m/s^2) / √Hz level	
Shock durability	10,000 m/s^2	
Protection rating	IP67	
Operational temperature range	-10 ℃ to +60 ℃ (non-condensing)	
Mass	Approx. 230 g	

*1 Specification is subject to change without notice.

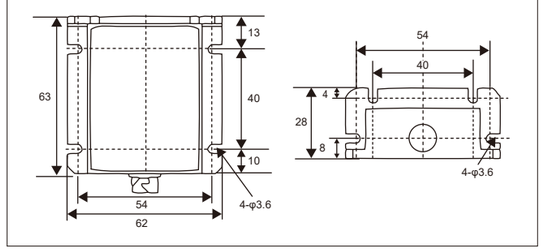
Standard composition (VP-8013M / VP-8013SM)

Item	Model	Notes
Acceleration pickup	VP-8013 / VP-8013S	———
Power supply unit	VM-8013	———
Water-proof cable	CB-X013-05	5 m
USB output AC adaptor	———	———
Micro USB cable	———	1 m
Carrying case	B-8013	Storage for magnet and additional cable

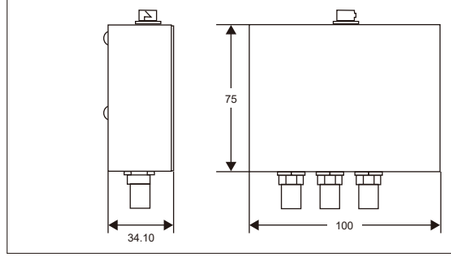
Option

Item	Model	Notes
Output BNC cable 3 pcs.	CXC-N-PPRG-1.5/3	Connector with BNC plug on both ends/1.5 m
Output BNC cable	CXC-N-PPRG-1.5	BNC connector on both ends/1.5 m
Output cable	CO-1970	Connector with BNC and alligator clip/1.5 m
Water-proof long cable	CB-X013-10	10 m, separately quotation for longer cable
Magnet	YA1870 / 2	Fixable only in longitudinal direction
Magnet (2 pcs./set)	YA1870	Use 2 connectors in the case of fixing horizontally
Data Viewer	VP8013App	Vibration analysis application (See next page)

Outward Dimensions Acceleration pickup (VP-8013)



Outward Dimensions Power supply unit (VM-8013)



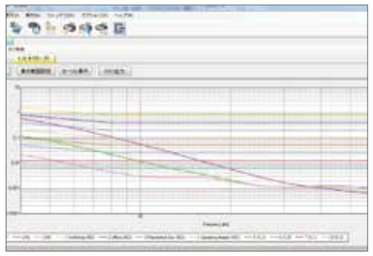
Data Viewer Application　VP8013App

Concept

VP DataViewer is a software for analysis according to the purpose using data measured with VP - 8013 and logger. Utilizing the broad-band measurement capability and microtremor measurement capability of VP - 8013, it is possible to perform various analyzes that were difficult to realize with one sensor so far. You can also read and analyze the saved file of the IMVFW format saved by another measuring device.

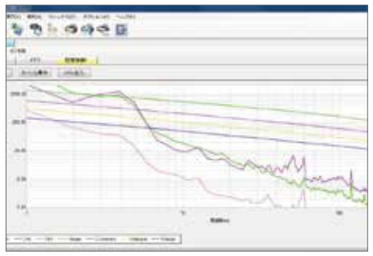
Application examples

Evaluation of ground, floor vibration



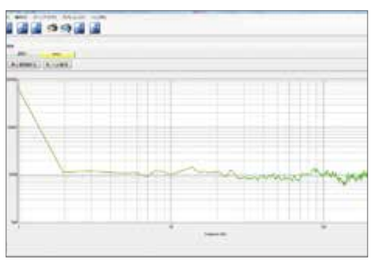
For evaluation of influence of traffic vibration on the building residential quality is performer by 1/3 octave acceleration analysis from 1 Hz. On the other hand, 1/3 octave velocity analysis from 4 Hz is now commonly employed by the environmental vibraton standard of the installation facility of the semicondoctor device manufacturing system etc. VP-8013 App has the criteria lines as above, therefore, those 1/3 octave analysis can be evaluated being compared to such lines.

Vibration evaluation for pipes



The evaluation standard that SwRI (Southwest Research Institute) determined is used for the vibration evaluation on the pipe fixing structure in chemical plants. This standard is referred on FFT analysis of the displacement from 1 Hz. VP-8013 App is equipped with SwRI evaluation standard, and it can compare the FFT result to the criteria of the standard directly.

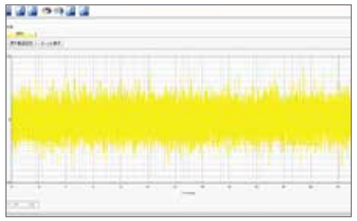
Analysis for low-speed-rotary machinery



For analysis of the main shaft imbalance of low-speed rotary machines less than 600 rpm is carried out targeting to mainly on 10 Hz or less frequency components. It can get FFT analysis immediatery from data of VP-8013 which can measure low level vibration easily.

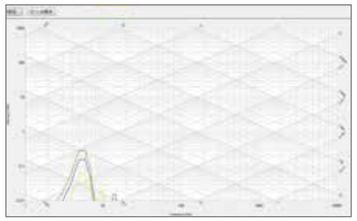
Screen image

■ Waveform display



This App can make DC cut from an acceleration waveform of VP-8013, BPF setting flexibly and support the conversion to velocity and displacement waveform.

■ Tripartite

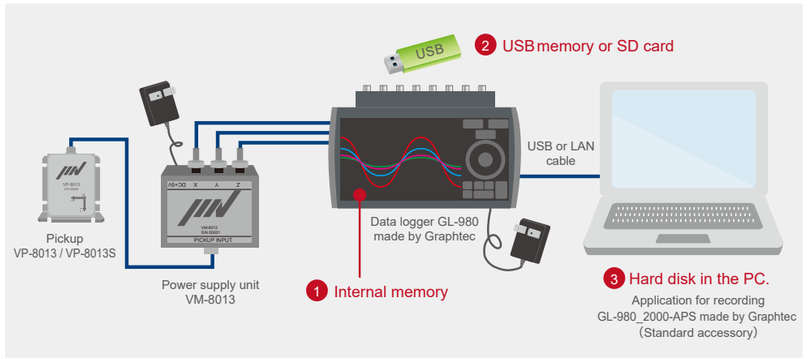


FFT result is refrected into a tripatite graph of frequency, displacement, velocity, and acceleration. You can locate vibration sources of the part to be paied attention.

■ Lissajous

Draws a trace graph displaying 2 axes vibration data. It is used to find influence of the wind find on the pole etc.

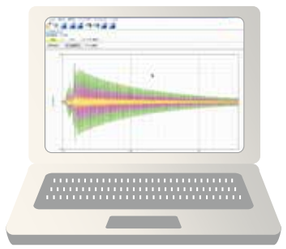
Connection on measurement



The recorded data stored in one of ① to ③.

Instllation image

Open the GL-980 data file by 8013App.



Data Viewer Application 8013App

Features (for measuring)

- Easy to set up
- Unnecessary to use with AC power supply while measuring
- Wide variety of recording method
- Can be installed temporarily with power supply by AC adapter.

Features (for analyzation)

- Measurement condition is read automatically by data of GL980
- The CSV form output is available

MEMO

Vibration Sensors

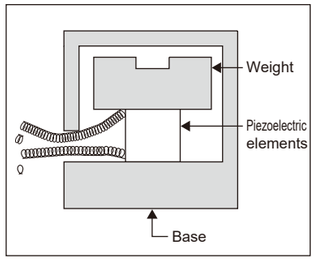
A vibration sensor is an equipment to detect a vibration and convert to an electrical signal. Usually, It is used being connected to an amplifier or a main unit of a vibrometer. To measure a precise vibration, selecting the most suitable sensor is very important.

Piezoelectric sensor >> P25
Option item for piezoelectric sensor >> P29

Piezoelectric sensor (Charge type)

Pressure type

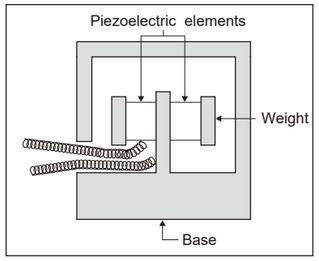
Pressure type has a piezoelectric element fastened by a screw between a piece of weight and the base. Measurement of pretty large shock is possible because of its advanced mechanical strength. The resonant frequency is high for its sensitivity. Therefore, the sensors of this type can be used not only for general applications but also for measurements on the high speed rotational machinery or detection of leakage from the pipe lines.



- ■Suitable for measurements of high frequency or high acceleration vibrations
- ■Stable works, advanced linearity
- ■Wide operation temperature range

Shear type

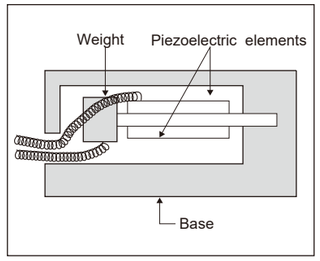
Shear type is constructed so that each piezoelectric element has shear that is proportional to applied acceleration between the poles. It is useful for low frequency vibration measurement even in the environments of large temperature change because it is hard to be effected by the pyroelectricity. Furthermore, it is less sensitive to the strain in the base.



- ■Suitable for measurements of high frequency or high acceleration vibrations
- ■Tough against the temperature change and disturbance caused by the strain in mounting section
- ■Covering from small and light to high sensitivity

Bending type

Bending type has a construction to get the signal from the piezoelectric elements glued on a metal plate which is bent being applied an acceleration. This is light weight and has high acceleration sensitivity to be suitable to monitor earthquakes or small vibration of the testing models of dam, power station or small equipments.

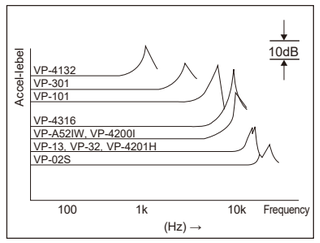


- ■Small size, light weight, high sensitivity
- ■Stable works, advanced linearity

Piezoelectric sensor (Build-in pre-amplifier type)

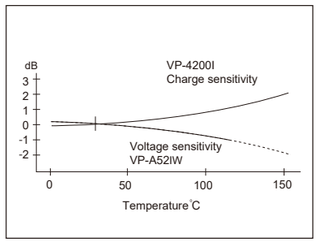
This is a piezo sensor which has a built in charge amplifier to output a low output impedance voltage signal.
Less expensive caxial cable can be laid long distance with minimum lowering of sensitivity and influence of external noise.
It is suitable for vibration monitoring. However, it is not recommendable for use in high temperature, in very high frequency range nor for meauament of very large accleraration.

Features



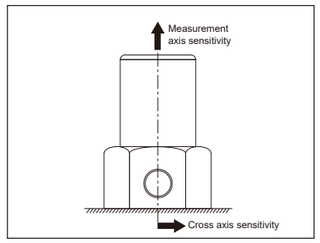
[Frequency response]

Upper usable frequency limit depends on its own resonant frequency or rigidity of mounting. Lower useful frequency is limited by the time constant of the amplifier.



[Temperature characteristics]

Acceleration sensitivity of a piezoelectric element is effected by temperature. While such effect is dependent on material and structure, high temperature gives larger capacitance, higher charge sensitivity and smaller voltage sensitivity generally.



[Lateral sensitivity]

Sensitivity to the acceleration applied along the axis of 90° to the sensitive axis is designed to be less than 5%.

Piezoelectric accelerometer

VP-4151

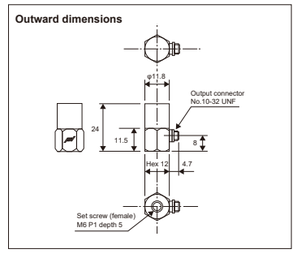
Charge/ compression type

Large acceleration

■ Specifications

Resonance frequency	> 36,000 Hz
Frequency range	fc* to 10,000 Hz ±1 dB
Charge sensitivity	1.5 pC/(m/s^2) ±10 %
Capacitance	500 pF ±20 %
Maximum arrowable acceleration	20,000 m/s^2
Operating temperature range	-30 to +150 °C
Cable connection	Sidewise 10-32 threaded connector
Weight	8 g
Material	Aluminum (A2017)

Outward dimensions



VP-4031IW

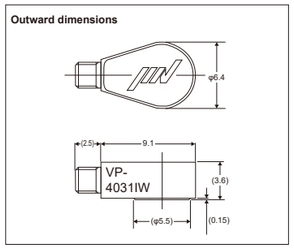
Built-in pre-amplifier shear type

Small

■ Specifications

Resonance frequency	> 50,000 Hz
Frequency range	1 to 13,000 Hz ±1 dB
Voltage sensitivity	1 mV/(m/s^2) ±10%
Maximum arrowable acceleration	5,000m/s^2
Power supply	2–10 mA constant current, voltage 21–30 V
Operating temperature range	-54 to +80°C (Constant current 2 to 10 mA) -54 to +120°C (Constant current 2 to 5 mA)
Cable connection	Connector (Lateral direction) Dedicated cable "C-4031IW-3" included as standard
Weight	Approx. 0.6 g (sensor only)
Material	Aluminum

Outward dimensions



VP-4201H

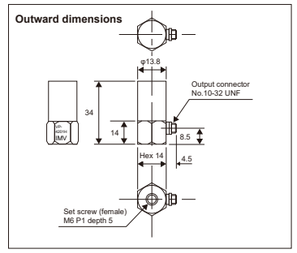
Charge/ compression type

High temperature

■ Specifications

Resonance frequency	> 23,000 Hz
Frequency range	fc* to 5,000 Hz ±1 dB
Charge sensitivity	5.0 pC/(m/s^2) ±20 %
Capacitance	1,000 pF ±20 %
Maximum arrowable acceleration	16,000 m/s^2
Operating temperature range	-20 to +250 °C
Cable connection	Sidewise 10-32 threaded connector
Weight	42 g
Material	Stainless steel (SUS304)

Outward dimensions



VP-02S

Charge/ share type

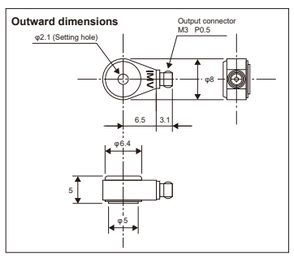
Small

Light

■ Specifications

Resonance frequency	> 60,000 Hz
Frequency range	fc* to 13,000 Hz
Charge sensitivity	0.22 pC/(m/s^2) ±20 %
Capacitance	940 pF ±20 %
Maximum arrowable acceleration	10,000 m/s^2
Operating temperature range	-20 to +150 °C
Cable connection	Sidewise M3 threaded connector
Weight	1.9 g
Material	Titanium and aliminum (A2017B)

Outward dimensions



VP-101

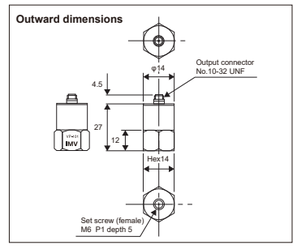
Charge/ share type

High sensitivity

■ Specifications

Resonance frequency	> 15,000 Hz
Frequency range	fc* to 5,000 Hz ±1 dB
Charge sensitivity	10 pC/(m/s^2) ±10 %
Capacitance	1,000 pF ±20 %
Maximum arrowable acceleration	3,000 m/s^2
Operating temperature range	-20 to +120 °C
Cable connection	Upward 10-32 threaded connector
Weight	35 g
Material	Stainless steel (SUS303)

Outward dimensions



VP-113R

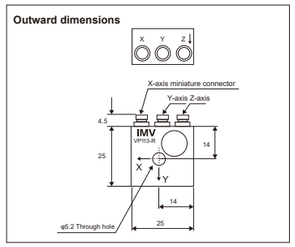
Charge/ share type

3 axis

■ Specifications

Resonance frequency	> 15,000 Hz
Frequency range	fc* to 7,000 Hz ±1 dB
Charge sensitivity	1.5 pC/(m/s^2) ±10 %
Capacitance	1,000 pF ±20 %
Maximum arrowable acceleration	5,000 m/s^2
Operating temperature range	-20 to +150 °C
Cable connection	Sidewise 10-32 threaded connector
Weight	40 g
Material	Titanium (TB340H)

Outward dimensions



*fc: The value is defined by the time constant of amplifier.

Piezoelectric accelerometer

VP-13

Charge/ share type

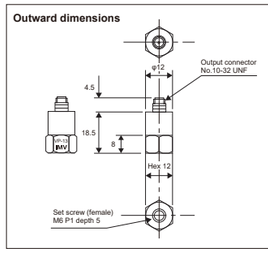
Large acceleration

General

■ Specifications

Resonance frequency	> 30,000 Hz
Frequency range	fc* to 10,000 Hz ±1 dB
Charge sensitivity	1.5 pC/(m/s^2) ±10%
Capacitance	1,000 pF ±20%
Maximum arrowable acceleration	20,000 m/s^2
Operating temperature range	-20 to +150
Cable connection	Upward 10-32 threaded connector
Weight	12 g
Material	Stainless steel (SUS303)

Outward dimensions



VP-2M1ZR

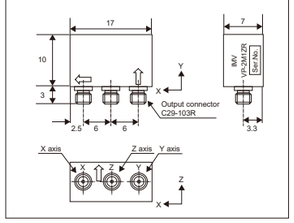
Charge/ share type

Small

■ Specifications

Resonance frequency	> 35,000 Hz
Frequency range	fc* to 10,000 Hz
Charge sensitivity	0.16 pC / (m/s^2) ±20%
Capacitance	440 pF ±20%
Maximum arrowable acceleration	50,000 m/s^2
Operating temperature range	-20 to +160°C
Cable connection	Sidewise M3 threaded connector
Weight	5.2 g
Material	Titanium

Outward dimensions



VP-301

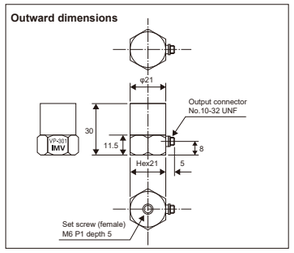
Charge/ share type

High sensitivity

■ Specifications

Resonance frequency	> 12,000 Hz
Frequency range	fc* to 3,500 Hz ±1 dB
Charge sensitivity	35 pC/(m/s^2) ±10%
Capacitance	1,500 pF ±20%
Maximum arrowable acceleration	1,500 m/s^2
Operating temperature range	-20 to +120
Cable connection	Sidewise 10-32 threaded connector
Weight	100 g
Material	Stainless steel (SUS303)

Outward dimensions



VP-32

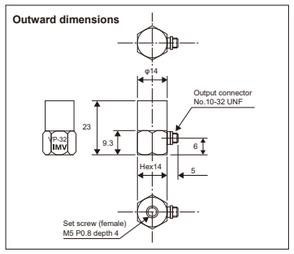
Charge/ share type

High sensitivity

■ Specifications

Resonance frequency	> 30,000 Hz
Frequency range	fc* to 10,000 Hz ±1 dB
Charge sensitivity	3.0 pC/(m/s^2) ±10%
Capacitance	2,000 pF ±20%
Maximum arrowable acceleration	9,800 m/s^2
Operating temperature range	-40 to +160°C
Cable connection	Sidewise 10-32 threaded connector
Weight	24 g
Material	Stainless steel (SUS303)

Outward dimensions



VP-4M2

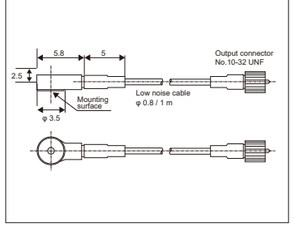
Charge/ share type

Micro

■ Specifications

Resonance frequency	> 60,000 Hz
Frequency range	fc* to 13,000 Hz ±1 dB
Charge sensitivity	0.035 pC/(m/s^2) ±20%
Capacitance	340 pF ±20%
Maximum arrowable acceleration	100,000 m/s^2
Operating temperature range	-50 to +160°C
Cable connection	Sidewise direct 10–32 with screw plug
Weight	0.2 g
Material	Titanium

Outward dimensions



VP-4M2Z

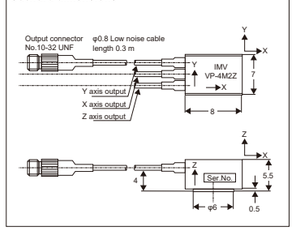
Charge/ share type

Micro

■ Specifications

Resonance frequency	> 50,000 Hz
Frequency range	fc* to 10,000 Hz
Charge sensitivity	0.04 pC/(m/s^2) ±20%
Capacitance	250 pF ±20%
Maximum arrowable acceleration	50,000 m/s^2
Operating temperature range	-50 to +160°C
Cable connection	Sidewise direct 10–32 with receptacle
Weight	1.2 g
Material	Titanium

Outward dimensions



*fc: The value is defined by the time constant of amplifier

Piezoelectric accelerometer

VP-420A

Charge/ share type

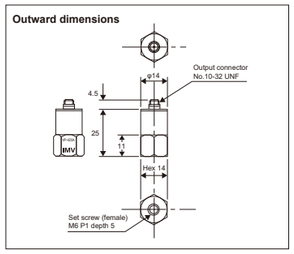
Large acceleration

General

■ Specifications

Resonance frequency	> 26,000 Hz
Frequency range	fc* to 7,000 Hz ±1 dB
Charge sensitivity	5.0 pC/(m/s^2) ±10%
Capacitance	1,000 pF ±20%
Maximum arrowable acceleration	5,000 m/s^2
Operating temperature range	-20 to +150°C
Cable connection	Upword 10-32 threaded connector
Weight	23 g
Material	Stainless steel (SUS303)

Outward dimensions



VP-4200I

Charge/ share type

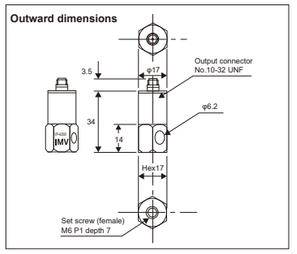
Isolated

General

■ Specifications

Resonance frequency	> 25,000 Hz
Frequency range	fc* to 7,000 Hz ±1 dB
Charge sensitivity	5.0 pC/(m/s^2) ±10%
Capacitance	1,000 pF ±20%
Maximum arrowable acceleration	10,000 m/s^2
Operating temperature range	-20 to +120°C
Cable connection	Upword 10-32 threaded connector
Weight	45 g
Material	Stainless steel (SUS303)

Outward dimensions



VP-4132

Charge/ bending type

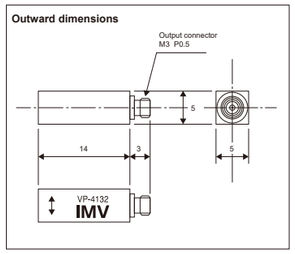
Light

High sensitivity

■ Specifications

Resonance frequency	> 3,000 Hz
Frequency range	fc* to 1,000 Hz ±1 dB
Charge sensitivity	3.5 pC/(m/s^2) ±20%
Capacitance	1,000 pF
Maximum arrowable acceleration	2,000 m/s^2
Operating temperature range	-20 to +80°C
Cable connection	Sidewise M3 threaded connector
Weight	0.9 g
Material	Aluminum (A5052)

Outward dimensions



VP-A1P0

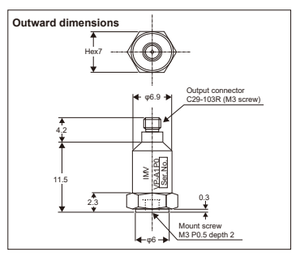
Built-in pre-amplifier shear type

Small

■ Specifications

Resonance frequency	> 40,000 Hz
Frequency range	3 to 12,000 Hz
Voltage sensitivity	1 mV/(m/s^2) ±10%
Maximum measurable acceleration	3,000 m/s^2
Power supply	0.5-5 mA constant current, voltage 15–25 V
Operating temperature range	-30 to +110°C
Cable connection	Upward M3 threaded connector
Weight	1.9 g
Material	Titanium

Outward dimensions



VP-A1P1

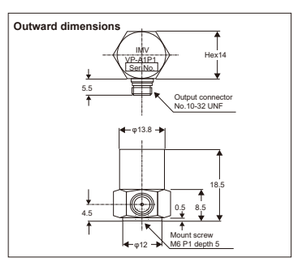
Built-in pre-amplifier shear type

General

■ Specifications

Resonance frequency	> 35,000 Hz
Frequency range	10 to 8,000 Hz
Voltage sensitivity	10 mV/(m/s^2) ±10%
Maximum measurable acceleration	300 m/s^2
Power supply	0.5–10 mA constant current, voltage 15–36 V
Operating temperature range	-50 to +110°C
Cable connection	Sidewise 10-32 threaded connector
Weight	10 g
Material	Titanium

Outward dimensions



VP-A1P1Z

Built-in pre-amplifier shear type

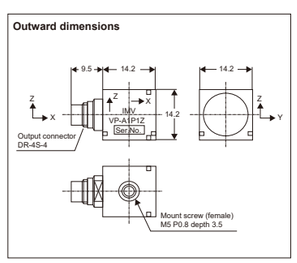
General

3 axis

■ Specifications

Resonance frequency	> 35,000 Hz
Frequency range	3 to 5,000 Hz
Voltage sensitivity	10 mV/(m/s^2) ±10%
Maximum measurable acceleration	500 m/s^2
Power supply	0.5–10 mA constant current, voltage 21–24 V
Operating temperature range	-50 to +110°C(5mA) / -50 to +70°C(10mA)
Cable connection	Sidewise dedicated connector
Weight	11 g
Material	Titanium

Outward dimensions



*fc: The value is defined by the time constant of amplifier

Cable assembries for piezoelectric accelerometer

Accelerometer	Connector	Cable	Connector on equipment side	Code name
VP-12 VP-113R VP-32 VP-4200 VP-4200I VP-101 VP-301 VP-A1P1 VP-4151	10-32 screw plug (MTS)	HB-2C (200℃)	BNC plug or 10-32 screw plug (MTS)	HB-2C / □ / MB HB-2C/ □ / MM
VP-4201H	10-32 screw plug (heat resistant)	HR-2C (260℃)	BNC plug or 10-32 screw plug (MTS)	HR-2C/ □ / MB HR-2C/ □ / MM
VP-02 S VP-4132 VP-2M1ZR VP-A1P0	M3 screw plug	HB-1.2C (200℃)	BNC plug or 10-32 screw plug (MTS)	HB-1.2C/ □ / SB HB-1.2C/ □ / SM
VP-42IW	TNC screw plug	HB-3C (200℃)	BNC plug	HB-3C/ □ / TB
VP-A1P1Z	DP-4S-1 screw socket	FEP (180℃)	BNC plug x 3	C-A1P1Z-3.3

□ : cable length

* The length of cable varies accoridng to settings and monitoring conditions. Please contact us for details.

Mounting adaptor for piezoelectric accelerometer

Small size strong magnet
(for flat surface)
MH-202R

Small size strong magnet
(for spherical surface)
MH-203R

Magnet
(Standard type)
KM-025C

Isolating spacer
IS-6
Cuts noise commming from object

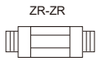
Glueing spacer AS-6
Glue for accelerometer to be fixed

Mechanical filter
MCF-6H
Cuts exessive high frecuency components

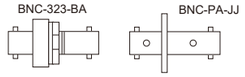
Interconnection conversion connector

BNC-P-C25J-A
Converts MTS to BNC

ZR-ZR
Converts MTS to MTS



BNC323-BA / BNC-PA-JJ
Setting BNC connector on panel



Related Products

IMV provides total service with various related products to support vibration measurements and evaluation.

Spin rotor kit/ Maicro master

VM-101/VM-111

Educational model to acquire vibration diagnosis skill

The normal and abnormal states are made artificially to compare each condition.

Features

- Reproduce the failure state (imbalance, bearing scratches) of rotating machinery
- Reproduce misalignment and gears *VM-101 only

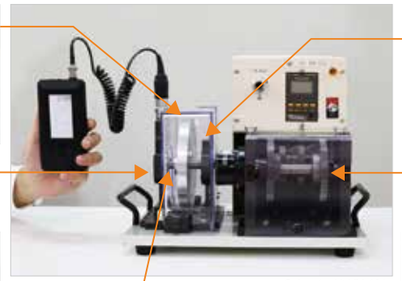
Spin roter kit VM-101

Maicro master VM-111

Function

Imbalance
Attach any weight to the rotating disk to create an unbalanced state.

Looseness of tightening bolts
An unbalanced weight (bolt) is attached to the rotating disk to make it unbalanced and create a loose state.
*VM-111 does not have this function.



Spin roter kit VM-101

Misalignment
Cause misalignment of the rotating shaft on the driven side from the axis on the driving side.
*VM-111 does not have this function.

Bearing defects
Use the unit with scratches on the outer ring as needed.

Missing gear
You can easily switch between normal gears and worn gears by tightening and loosening one bolt.
*VM-111 does not have this function.

Specifications

▶ VM-101

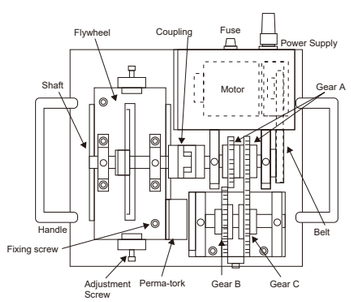
Model	Specifications
Number of rotations	0 to 1.410 rpm
Power supply	AC100 V　50/60 Hz
Size	265 (W) × 350 (L) × 275 (H) mm
Mass	Approx. 20 kg

▶ Bearing specifications

Model	1302 (NSK)
Rolling element diameter	6.35 mm
Number of rolling elements	10 pcs.
Pitch diameter	27.6 mm
Contact angle	9°00′

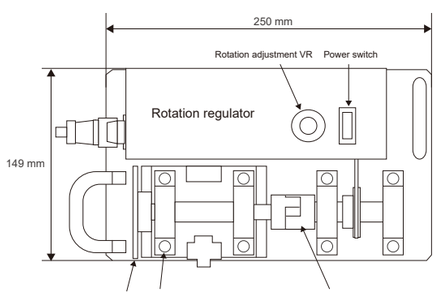
▶ Gear specifications

Gear A	Numeber of cogs 56 (normal, fixed)
Gear B	Numeber of cogs 90 (missing cogs)
Gear C	Numeber of cogs 56 (normal)



▶ VM-111

Model	Specifications
Number of rotations	100 to 3000 rpm
Power supply	AC100 V　50/60 Hz
Size	250 (W) × 149 (L) × 100 (H) mm
Mass	Approx. 3.9 kg



Warranty and Maintenance

■ Warranty

All IMV products are shipped after passing the strict quality control inspection, but if you find any failure, please inform us the details.

Warranty period

The warranty period is one or two years. (It depends on the product. Please contact us the further information.)

Warranty coverage

(1) If the failure happens in the above mentioned period due to the fault of IMV, repair will be made free of charge. However, the following cases are excepted.

1. Damage caused during transportation / transfer at your side by handling mistake.
2. Damage caused by natural disaster such as fire, earthquake, flood and lightning or abnormal voltage.
3. Damage caused by use with another product.
4. Damage caused by disassembling, repair or remodel by others who is not our personnel.

(2) Limit of coverage is the extent described in (1). Any secondary damages (failure of other equipments, opportunity loss, lost profit etc.) caused by failure of IMV products at the customers are exempted from the coverage.

■ Maintenance

■Inspection at our factory

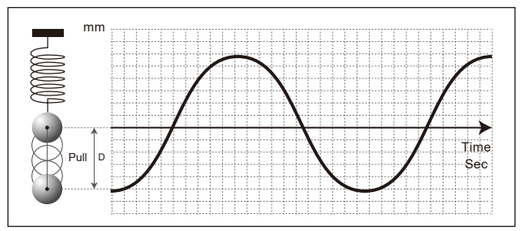
●Details
・Inspection/calibration/operation check/comprehensive dynamic calibration after operation verification
・Submission of reports and test results
・Traceability chart/calibration certificate are issued on request.
*An official quotation will be provided if repair or replacement of consumable goods are needed.

Contact/Delivery address

IMV CORPORATION　MES Business Division
2-6-10 Takejima, Nishiyodogawa-ku, Osaka, 555-0011, Japan
TEL : +81-6-6471-3155
FAX : +81-6-6471-3158

Section 1 Vibration Terminology

Vibration means the state of an object moving repetitively back/forward, right / left or up / down and is generally expressed by Frequency, Displacement, Velocity, and Acceleration.
These 4 elements are generally denoted as F, D, V, A.
This is illustrated simply as a spring and mass. When the mass is pulled down from the start position and released, the mass moves just like the vibration waveform shown in the figure on the right.



Frequency

Frequency means the number of times that vibrating object makes a repetitive motion in 1 second.
Unit：Hz

Displacement

Displacement means the amplitude (distance) between the peaks of vibration.
Unit：μm, mm

Velocity

Velocity means the time rate of change of displacement (D).
Unit:mm/s, cm/s

Acceleration

Acceleration means the time rate of change of velocity (V).
Unit：m/s², g

PEAK(Peak amplitude)

Peak value in a certain time duration.
It is used to measure shocks or waves which are rather stable.

$$V_{PEAK} = |v(T)|_{max}$$

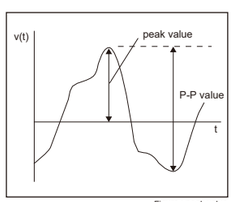


Figure : peak value

rms(Root Mean Square value)

Root mean square value of the instantaneous values in a certain time duration relates to the power of the wave. The rms value of velocity is one of the important factors for machinery status diagnosis.

$$V_{rms} = \sqrt{\frac{1}{T}\int_{t1}^{t2} v(t)^2 dt}$$

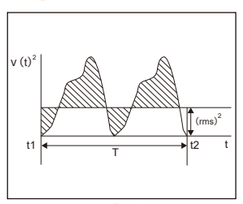


Figure : root mean square value

C・F（Peak factor・Crest factor)

PEAK to RMS ratio
It is used to determine deterioration of bearings by relative comparison.
C･F =PEAK / rms

EQP（Equivalent Peak value）

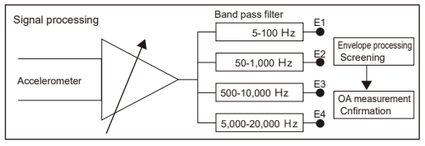
It is a sine peak assumed by the rms value.
For Sine wave, the relationship rms×√2=PEAK is valid. For a vibration monitoring system, there is a case that EPQ is monitored instead of the peak value itself avoiding to trigger the erroneous alarm by any accidental signal.

Envelope

The following terms are of analysis methods defined in IMV.

• Envelope acceleration (E1～E4)

Useful for bearing status diagnosis.
A machinery status is determined by the following four elements.



1) Smoothness element (E4)
The machine doesn't need to be stopped or disassembled when smoothness of the abnormal part (mechanical elements) is improved.

2) Sound element (E3)
The audible element is detected when metal contacts is getting strong. If no change after improvement of smoothness, reexamination of pre-loading, internal gap, or loading status will be necessary.

3) Scratch element (E2)
It is the element which appears when the metal contacts are apparently visible. This elements will help to make strategy for delaying the progress of scratches by improving of smoothness or changing the operation condition or for observing its pattern to replace the bearings in an optimum time.

4) Structural resonance (E1)
It is the element when the structures vibrates by serious damage.
It is normally the elements to evaluate imbalances or misalignments, but it might be necessary to pay attention if there is a signal of gears or bearing.

・The machinery whose rotational speed is up to approximately 3,600 rpm is possible to be judged for the status of the bearing by the element classification mentioned above.
・The reason why FFT of high resolution is necessary for facility diagnosis is that machine vibrations, abnormal bearing signals and working noise of gears locate closely each other in a narrow frequency bands.

• H function

Effective function to detect abnormal bearing noises. Applicable models : SmartVibro *VM-4424H only (P11), Digital charge-input vibrometer (P17)

Section 2 Judge criteria

ISO vibration evaluation standard

This standard is widely used for synthetic judgment of rotational machinery.
The current ISO standard 10816-3:2009 describes the absolute value judgment by velocity rms.

Applicable models: CardVibro Air2 (P5), Portable Vibrometer (P9)

Objective machinery is classified into two major groups.

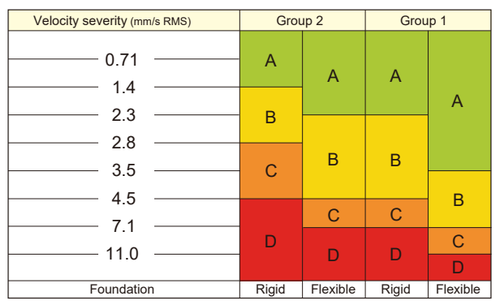
Group 1

Large machinery
Output: 300 kW to 50 MW, Shaft hight: >315 mm

Group 2

Medium machinery
Output: 15 kW to 300 kW, Shaft hight: 160 mm to 315 mm

ISO 10816-3:2009 Vibration Standard Evaluation



A : good B : Satisfactory C : Unsatisfactory (alert) D : Unacceptable (danger)

Bearing evaluation basis

Envelope acceleration: Evaluation basis vibration for E3

It is generally said that acceleration measurement is suitable for detecting the bearing scar, but it sometimes might be difficult to judge because of various mixing noise.
Bearing valuation basis is the absolute judgment value of acceleration E3 after envelope processor.

Applicable models: CardVibro Air2 (P5)

Classification

(a) Class 1	Bearing inner diameter: 200 to 500 mm Rotation speed: slower than 500 RPM
(b) Class 2	Bearing inner diameter: 50 to 300 mm Rotation speed: 500 to 1800 RPM
(c) Class 3	Bearing inner diameter: 20 to 150 mm Rotation speed: 1800 or 3600 RPM Judgment is made using peak value of E3.

*Judgments are made selecting the validation basis by shaft diameter / rotation speed of measurement object machinery.

Classification is made by shaft diameter and rotational speed of the machine.

Vibration severity	Shaft diameter / Rotational speed		
Fmax 60,000 CPM 1000 Hz	Class 1 Shaft diameter : 200-500 mm Rotational speed＜500 RPM	Class 2 Shaft diameter : 50–300 mm 500＜Rotational speed＜1800 RPM	Class 3 Shaft diameter : 20–150 mm Rotational speed : 1800 or 3600RPM
1.0 [m/s²E] 0.1 [GE]			
4.9 0.5	Good	Good	Good
7.4 0.75	Satisfactory		
9.8 1		Satisfactory	
19.6 2	Alert	Alert	Satisfactory
39.2 4			Alert
98.1 10	Danger	Danger	Danger

1 G=9.806 m/s²

Section 3 Vibration measuring equipment

How to conduct machinery diagnosis

1. Check the measuring objects

A. Type ——— General classification such as motor or fan
B. Specifications — Data such as rotational speed or capacity are especially important information for vibration measurement.
C. Composition — Information of bearing structures etc. are essential for investigation of the cause of vibration and location of the measuring points.

2. Preparation of measurement

A. Determination of measuring points ——— It is ideal to make measurements in three directions.
B. Determination of measuring mode ——— Velocity should be used for comprehensive diagnosis. Acceleration should be used jointly for diagnosis of the elements as bearings, gears, or valves. If the vibrometer used is equipped with the envelope acceleration E1 – E4 function, B function or H function, use of these functions is recommended instead of acceleration.

3. Measurment

Please start after making check and preparation mentioned above.

1) Attachment of pickups or accelerometers

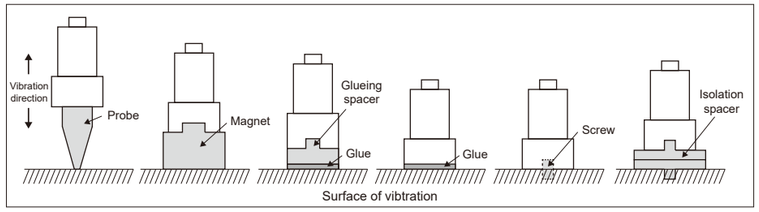
Wrongly attached pickups or accelerometers may cause unstable measurements or incorrect data aquisition.

A … Place or attach firmly.
B … Make all mount surfaces adhere closely.
C … Align vertically or horizontally on the axis of the object.

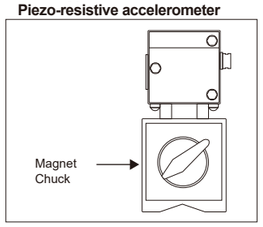
2) Check data

Please measure several times to confirm no data fluctuation or evenness for the first time.

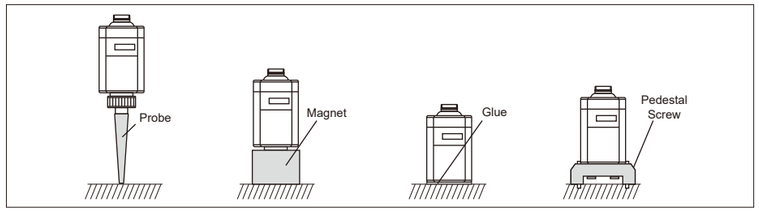
■ **Piezoelectric accelerometer**



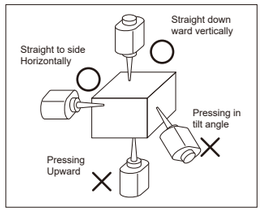
■ **Servo type or Piezo-resistive accelerometer**



■ **Electrodynamic velocity pickup**



■ **Hand held vibrometer**



4. Evaluation

Make an evaluation based on a measured data.

Absolute value judgment

A …Evaluation by velocity rms should be done referring to Section 2.1 " JIS / ISO Vibration evaluation standard".
If the data fall in rank D, the status of the object might be in dangerous region. Try another diagnosis method for justification.

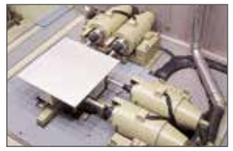
B …Bearing diagnosis
Even if any abnormal velocity rms were not obtained, the initial degradation as of the scratches on bearings or short of grease might be found by measurement of acceleration.

*These criteria should be used just as references. If they are considered unrealistic, use other criteria depending on the condition of the object.
*Fine diagnosis using a FFT analyzer is effective to make investigation on the judgment as 'abnormal'.

Other product and service information

■ Vibration test systems

Vibration test systems reproduce vibrating environments onto products. It enables evaluation of the product durability and the reliability.
As part of our focus, IMV produces 6 degree of freedom (6DOF) vibration test systems which reproduce real vibrating environments and ecologically friendly intelligent systems. IMV has the biggest share in vibration test systems in the world market.


6 degree of freedom vibration test systems


Vibration test systems (A-series)

■ Test laboratory

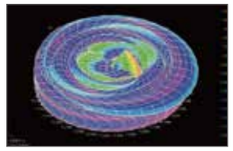
Since Japan's first establishment of vibration/shock test laboratory in Tokyo in 1998, we have been developing test laboratory businesses as Osaka test laboratory in 2005, Nagoya test laboratory in 2007 and the first overseas test laboratory in Thailand in 2012. Corresponding to development of the hybrid car, we newly open the Advanced Technology Centre for Environmental Testing which is specialized in the battery testing and test for the large specimens in Uenohara, Yamanashi in 2015.


Kasugai laboratory


IMV TECHNO VIETNAM COMPANY LIMITED

■ Solution service

Experienced IMV engineers supports to solve the problems of vibration and noise in any industrial field.


Simulation analysis of structural modification


Sound isolation design and work for manufacturing facilities

■ Environmental reliability evaluation system

IMV has released 1 ch / 1 power supply / 1 measurement circuit Migration Testers (of MIG series) first in the test equipment industry and others.


MIG-8600B


MIG-87

Head office / Sales Office

End of sales products and alternative systems

	End of sales			Alternative systems	
	Model	Product name	Maintenance period	Model	Product name
1	TR-0220	Transport Environment Recorder Tough Logger	End	TR-1000	Transport Environment Recorder Tough Logger
2	TYPE6226/6224	Integrating sound level meter	End	—	—
3	VM-0110	Multi-Channel Data Rogger System	End	VM-0330/16	Data Acquisition Analysis System Wave Stocker
4	VM-1220 C	Vibration Level Meter	End	TYPE3233	Vibration Level Meter (for Vibration Pollution)
5	VM-2001 series	Card VibroΣc / Card Vibro⊿c	End	VM-2012/VM-2012C	CardVibro Air2
6	VM-2002Tr	Pocket Trend	End	VM-2012/VM-2012C	CardVibro Air2
7	VM-2004 Neo Type212	CardVibro Neo	End	VM-2012/VM-2012C	CardVibro Air2
8	VM-2005 Adv Type212	CardVibro Advabance	End	—	—
9	VM-2011	CardVibro Air	End	VM-2012/VM-2012C	CardVibro Air2
10	VM-3004SI	Porta Vibro	End	VM-3024H	SmartVibro Electro-dynamic Type High-end
11	VM-3024S	SmartVibro Electro-dynamic Type standard	End	VM-3024H	SmartVibro Electro-dynamic Type High-end
12	VM-3304SI	Ana Vobro	End	VM-3024H	SmartVibro Electro-dynamic Type High-end
13	VM-3314 A	Portable Vibrometer	End	VM-3024H	SmartVibro Electro-dynamic Type High-end
14	VM-3314 AL	Low Frequency Portable Vibration Meter	End	VM-2012/VM-2012C, VM-7024H	CardVibro Air2, SmartVibro Electro-dynamic Type High-end
15	VM-3324 A	Portable Vibrometer	End	VM-3024H	SmartVibro Electro-dynamic Type High-end
16	VM-3324 AL	Low Frequency Portable Vibration Meter	End	VM-2012/VM-2012C, VM-7024H	CardVibro Air2, SmartVibro Piezo-resistive Type High-end
17	VM-4005	Trendvibro	End	VM-2012 + DS-2013 Tr	CardVibro Air2 + Equipment Diagnosis Software
18	VM-4105	TrendvibroZ	End	VM-2012 + DS-2013 Tr	CardVibro Air2 + Equipment Diagnosis Software
19	VM-4316	Bearing Checker	End	VM-4424H, VM-4431	SmartVibro Piezoelectric Type High-end, Portable Vibrometer
20	VM-4416SI	Bearing Checker	Till March. 31st, 2028	VM-4424H, VM-4431	SmartVibro Piezoelectric Type High-end, Portable Vibrometer
21	VM-4424S	SmartVibro Piezoelectric Type standard	End	VM-4424H, VM-4431	SmartVibro Piezoelectric Type High-end, Portable Vibrometer
22	VM-4515SI	Thermo Vibro	End	VM-4424H, VM-4431	SmartVibro Piezoelectric Type High-end, Portable Vibrometer
23	VM-7000L	Gal Vibro	End	VM-7024H	SmartVibro Piezo-resistive Type High-end
24	VP-12	Piezoelectric Accelerometer	End	VP-13	Piezoelectric Accelerometer
25	VP-4000	Piezoelectric Accelerometer	End	VP-420A	Piezoelectric Accelerometer
26	VP-4200-6	Piezoelectric Accelerometer	End	VP-4201H	Piezoelectric Accelerometer
27	VP-4200H	Piezoelectric Accelerometer	End	VP-4201H	Piezoelectric Accelerometer
28	VP-42IW	Piezoelectric Accelerometer	End	VP-43IW	Piezoelectric Accelerometer
29	VP-A11IW	Piezoelectric Accelerometer	End	VP-A12IW	Piezoelectric Accelerometer

*Refer to IMV website for the old systems which is not listed above.
https://www.imv.co.jp/e/products/end/list_01.php