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Vibration Monitoring System Catalogue

Every object having any movable element will generate some vibration or be exposed to some externally transmitted vibration. Such vibration will give the machinery or structures some damage fatal ones at the worst. Therefore, vibrations on the plant equipments should be observed by vibration monitoring systems always to prevent such damages or disasters.

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.

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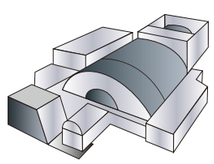
Selection Guide for Vibration Monitoring System

System	Contact Sensor Type Vibration Monitoring System P5	Signal Converter P7	DC4-20 mA Output Accelerometer P9	Vibration Switch P10	Vibration Signal Converter P11	Vibration Switch P12
Model	VM-9301 series	VM-5011A	VP-420/VP-421/ VP-422	VM-90A	VM-90D series	VM-90M series
Indicator	○	—	—	—	○	○
Alarm relay contact	1 - 2	—	—	2	1	2
Level output (DC4-20 mA)	○	○	○	○	○	○
Function changeover*	—	—	—	○	○	—
Simultaneous monitoring for plural functions	○	○	—	—	—	—

*Changeover of displacement/velocity/acceleration

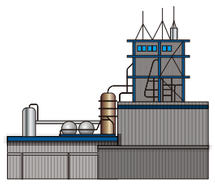
Application examples

■ General machinery

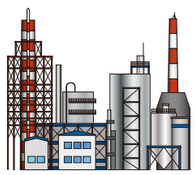


Large motor

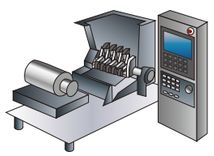
Gas tank



Heavy industry plant

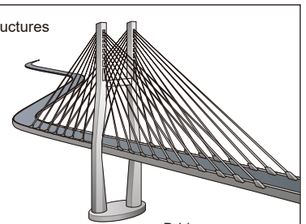


Power plant

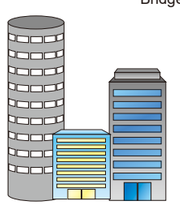


Machine tool, crusher etc.

■ Structures



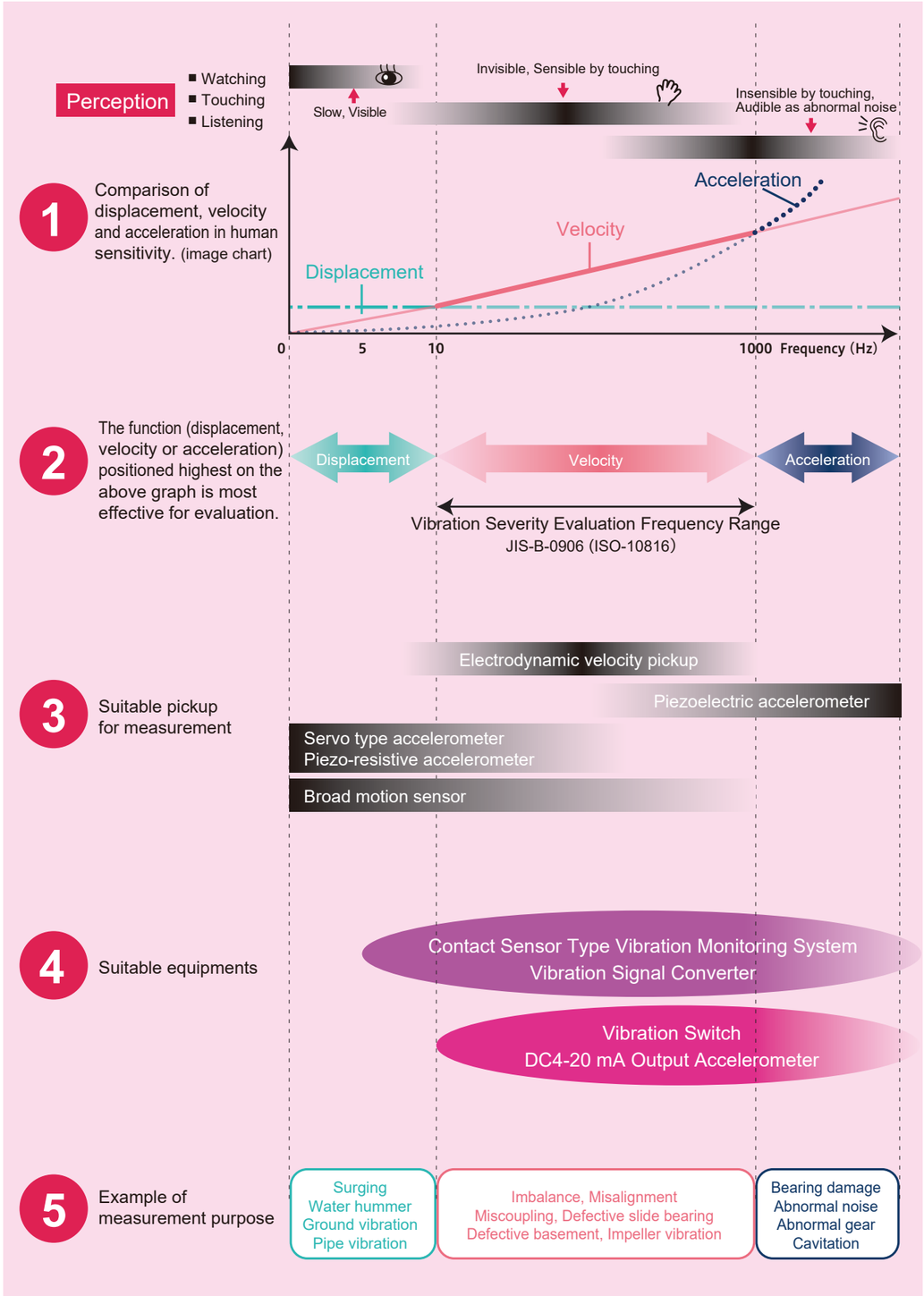
Bridge



Buildings

How to select vibration monitoring system

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



Contact Sensor Type Vibration Monitoring System

VM-9301 series

Permanent vibration monitoring for systems such as motor, pump and blower.

Monitoring system suitable for multi-channel measurement. Frequency range, measurement range or output signal can be customized.

Features

- Mixed implementation with the conventional system “VM-9201” is possible
- Wide variety of compatible sensors
- Available for multi-channel system

Type 1 channel

Type 12 channel

Compatible with conventional systems

Conventional system VM-9101

Upgrade to VM-9301

▶ VM-9101→VM-9301

1. Can be replaced with half size (indicator).
2. Can be redesigned for use in a power station.
   (adding insulated analog output/arrester/cable disconnection detection function)
3. Sensors used with VM-9101 can be diverted.*
4. Cables used with VM-9101 can be diverted.*

Conventional systemVM-9201

Upgrade to VM-9301

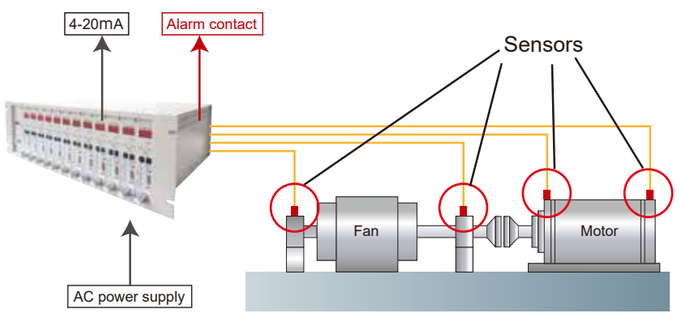
▶ VM-9201→VM-9301

1. Size is exactly same, so any shape modification is unnecessary.
2. Renewal of internal circuit parts enables stable supply.
3. Sensosr used with VM-9201 can be diverted.*
4. Cables used with VM-9201 can be diverted.*

*Please contact us if you have aged sensors or cables.

Application examples

Cables are laid out between sensors located on a large sized motor of home power generator and a monitoring system housed in a control panel. Monitoring systems can monitor vibration values and output the alarm in an emergency.



Suitable sensors

Selectable from electrodynamic velocity sensor or piezoelectric sensor.

Electrodynamic velocity sensor Specialized in medium frequency (up to 1,000 Hz) vibration detection. Suitable to velocity monitoring.

Feature	General-purpose type	2-axis	3-axis	Flame-proof	For low rotation	For low rotation/Flame-proof
Type	VP-3144 C/D	VP-3354 A	VP-3364 A	VP-3134 AEX	VP-3213 AC/AD	VP-3133 HEX/VEX
Sensitivity	10 mV/ (mm/s)	10 mV/ (mm/s)	10 mV/ (mm/s)	10 mV/ (mm/s)	17.5 mV/ (mm/s)	17.5 mV/ (mm/s)
Frequency Range	10 to 1,000 Hz	10 to 500 Hz	10 to 500 Hz	10 to 500 Hz	5 to 500 Hz	5 to 500 Hz
Natural frequency	14 Hz	14 Hz	14 Hz	14 Hz	4.5 Hz	4.5 Hz
Operating temperature range	-20 to +80℃	-20 to +80℃	-20 to +80℃	-20 to +70℃	-20 to +70℃	-20 to +70℃
Structure	Drip-proof (Equivalent to IP32)	Water-proof (Equivalent to IP66)	Water-proof (Equivalent to IP66)	Flame-proof (EX d Ⅱ BT4Gb)	Drip-proof (Equivalent to IP32)	Flame-proof (EX d Ⅱ BT4Gb)
Outward appearance	 Type C				 Type AC	
Notes	—	—	—	—	Horizontal only	H (horizontal only), V (vertical only)

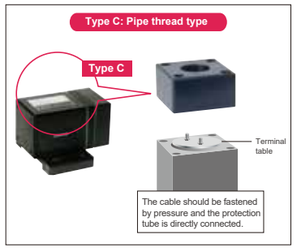
*Other sensors for high temperature or waterproof are also available. Please contact us for details.

Piezoelectric sensor Specialized in high frequency (over 1,000 Hz) vibration detection. Suitable to acceleration monitoring.

Feature	General-purpose type	Flame-proof
Type	VP-A52IW	HS-100I
Sensitivity	5 mV/ (m/s^2)	50mV/G
Frequency Range	3 to 10,000 Hz	2 to 10,000 Hz
Natural frequency	35,000 Hz	24,000 Hz
Operating temperature range	-30 to +110℃	-20 to +80℃
Structure	Isolated/Water-proof	Safe and explosion proof (Ex ia Ⅱ C T4 Ga)
Outward appearance		 Use as a set with MTL7728

*Other sensors for high temperature or waterproof are also available. Please contact us.

The difference between C and Dis the shape of cable connection.

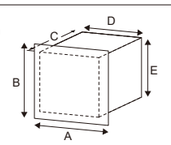


Specifications

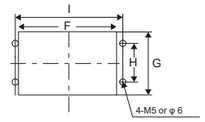
Type		VM-9301 series	VM-9301A series
Sensor		Electrodynamic velocity sensor	Piezoelectric sensor
Amplifier unit type		Type 1 line: VA-9301(1-I) Select velocity or displacement Type 2 line: VA-9301(2-I) Simaltaneous measurement of velocity and displacement	Type 1 line: VA-9301A (1-I) Select acceleration, velocity or displacement Type 2 line: VA-9301A (2-I) Simaltaneous measurement of any two of acceleration, velocity or displacement
Frequency range		Low: 5 to 500 Hz (-11 to +6%) Medium: 10 to 500 Hz (-11 to +6%) Filter selectable (pass band) High-pass filter: 5, 10, 15, 20, 50, 100 Hz Low-pass filter: 20, 50, 100, 200, 500 Hz	5 to 10 kHz(-30 to +6%) Filter selectable (pass band) High-pass filter: 5, 10, 20, 50, 100 Hz Low-pass filter: 100, 200, 500, 1k, 5k, 10 kHz (High-pass filter: 20 Hz- in case of displacement or velocity Low-pass filter: -500 Hz in case of displacement, -1 kHz in case of velocity)
Measurement range	Displacement	50, 100, 150, 200, 300, 500, 999 (1,000) μmP-P	100, 150, 200, 300, 500, 999 (1,000) μmP-P
	Velocity	10, 15, 20, 30, 50 mm/s	10, 15, 20, 30, 50 mm/s
	Acceleration	———	10, 15, 20, 30, 50, 100, 150, 200, 300, 500 m/s^2
Equipment failure	Indication lamp	Orange LED located on the upper part of amplifier front panel〔FAT〕 Secondary power is lit at ubnormal condition.	
	Alarm contact	1a contact (open at normal condition) operate under fuse melting, power switch shut off and primary / secondary power failure	
	Alarm reset	Select from automatic or manual recovery	
Pickup cable break alarm	Indication lamp	Green LED located on the upper part of amplifier front panel〔PU〕 Lights-out when wire is broken (lights-on at normal condition) (When pickup connected with charge amplifier is used, this function is not valid.)	
	Alarm contact	Standard: 1a contact *available 1b or 1c (open at normal condition, closed when wire is broken) operate when pickup cable is broken.	
	Alarm reset	Select from automatic or manual reset	
Alarm	Alarm step	Type 1 line: upper limit 2 steps Alarm (ALM) / Trip (TRP) Type 2 line: upper limit 1 step Alarm1 (ALM1, 1line), Alarm2 (ALM2, 2line)	
	Delay timer	Select from 0 to 15 sec. by the slide switch inside of the amplifier unit (0 sec. if not specified.)	
	Setting range	5.0 to 99.9% (can be set at 0.1% step) (When alarm function is not used 99.9 % is set. Indication lamp and contact is on at over fullscale value)	
	Indication lamp	Type 1 line: Orange LED [ALM], red LED [TRP] Type 2 line: Orange LED [ALM1], red LED [ALM2]	
	Alarm contact	Select from “ALM/ALM1 circuit: 2a contact TRP/ALM2 circuit 2a contact” or “ALM/ALM1 circuit: 1b1a contact TRP/ALM2 circuit 1a1b contact”	
	Contact capacity	AC110 V 2 A (DSP Relay made by Panasonic) DC30 V 0.2 A	
	Alarm reset	Select from automatic (Hysteresis 3%) or manual reset	

Type		VM-9301 series	VM-9301A series
Rectified level output	DC output 1	Select from DC4-20 mA (insulation output), Loading 500 Ω or less or DC1-5 V (insulation output), Loading 100 kΩ or more	
	DC output 2	Select from DC4-20 mA (insulation output), Loading 500 Ω or less or DC1-5 V (insulation output), Loading 100 kΩ or more	
Waveform output	Pickup waveform output	AC±10 mV/(mm / s) or AC±17.5 mV/(mm/s), Loading 100 kΩ or more (Depending on sensor specifications)	AC±5 mV/(m/s^2), Loading 100 kΩ or more (Depending on sensor specifications)
	Waveform output	AC±5 V (at the full-scale), Loading 100 kΩ or more	
Panel meter		Red LED three-digit indication, [9.9.9] is displayed at over 120% of full-scale	
Operating temperature range		0 to 50℃, 20 to 95% RH, wet bulb temperature is 35℃ (non-condensing)	
Power supply		Available range AC 85 to 264 V, 47 to 66 Hz	
Power consumption		20 VA or less (1 ch), 30 VA or less (3 ch), 45 VA or less (6 ch), 60 VA or less (9 ch), 75 VA or less (12 ch) At AC100V (Depends on the number of amplifier or power supply)	
Painting color		Munsell 5Y7/1, half matted	
Mass		Approx. 2.0 kg (1 ch), approx. 3.9 kg (3 ch), approx. 5.9 kg (6 ch), approx. 8.2 kg (9 ch), approx. 10.2kg (12 ch)	

Outward dimension



Panal cutout dimension



Dimension / Channel	A	B	C	D	E	F	G	H	I
Type 1 channel	90	170	300	88	132	90	148	162	50
Type 3 channel	210	149	300	160	132	180	143	100	195
Type 6 channel	300	149	300	250	132	270	143	100	285
Type 9 channel	390	149	300	340	132	360	143	100	375
Type 12 channel	480	149	300	430	132	450	143	100	465

Unit: mm

Signal Converter

VM-5011A

Slim type vibration transducer

It can output 4-20 mA DC current and 0-10 V DC voltage. This converter is suitable for measuring vibration of thousands of equipment.

VP-8021A

Features

- Low cost and compact size
- Changeover type for measurement mode and range
- Simultaneous output of envelope acceleration and velocity
- Vibration waveform output can be used for frequency analysis
- Vibration level output (DC4-20 mA)

Speed monitoring: Trend monitoring due to rotation speed
Acceleration envelope monitoring: Bearing scratches can be detected

Function

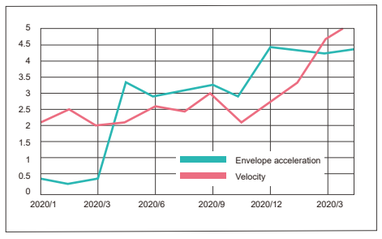
Converter for connecting to PLC

The signal converter (VM-5011A) is a converter that converts the output signal of the vibration sensor (VP-8021A). It is also possible to connect to a PLC that cannot be directly connected to the VP-8021A. In addition to PLC, any device that can take in current (4-20 mA) or voltage (0-10 V) can be connected.

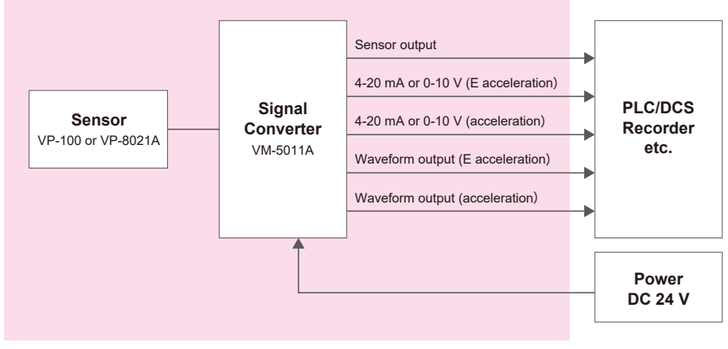
VM5011A connection example

Conversion to envelope acceleration and velocity

The VM-5011A can calculate and output the signal of the VP-8021A to the envelope acceleration and velocity.
Envelope Acceleration: Effective for bearing diagnosis
Velocity: Effective for detecting imbalance and misalignment



System composition



Suitable sensors

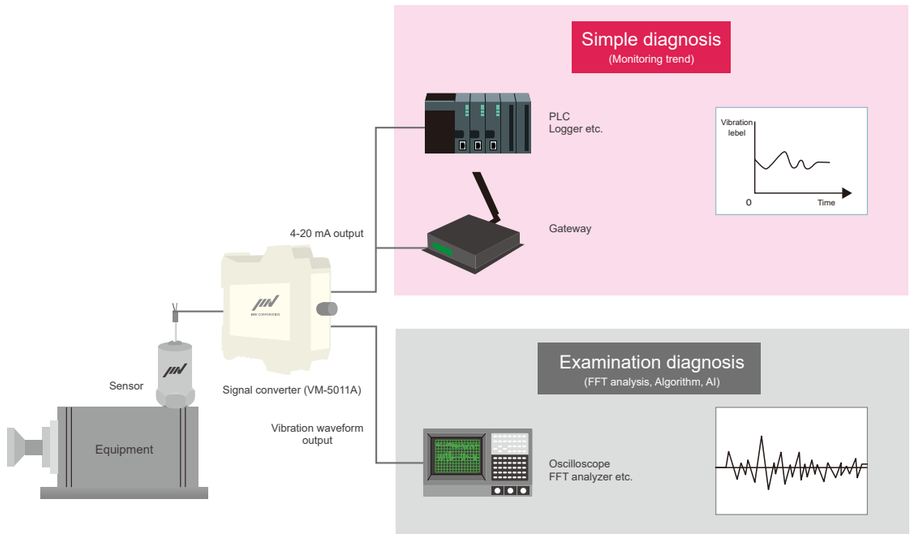
Model	VP-8021A
Sensor type	Base insulated voltage drive type
Acceleration sensitivity	3.9 mV/(m/s^2) ±5%
Vibration frequency response	20 Hz to 3 kHz ±1 dB
	10 Hz to 8 kHz ±3 dB
	10 Hz to 10 kHz ±4 dB
Operating temperature range	-30˚C to +120˚C
Sensitivity change due to temperature	±3% 25˚C standard
IEPE power supply	3.5 mA Maximum 24 V
Note	Standard type

Model	VP-100 (standard)	VP-100R (Oil and water resistant type)
Sensor type	Piezoelectric Compression type (Built-in pre-amplifier)	
Resonance frequency	22 kHz or more	
Frequency range	2 Hz to 10 kHz	
Acceleration sensitivity	100 mV/g	
Shock resistant	5000 g	
Maximum measurement acceleration	±80 g	
Sensor drive current	0.5 to 8 mA (DC18 to 30 V)	
Output impedance	Maximum 200 Ω	
Operating temperature range	-55 to 140˚C	-30 to 90˚C
Protection grade	IP65	IP68
Mass	Approx. 125 g (Cable not included)	
Material	SUS303	
Mounting method	M6Screw fixing	
Cable material	SUS Braided cable	PUR
Standard cable length	5 m	
Maximum cable length	200 m	

VP-8021A

VP-100

Connection Example

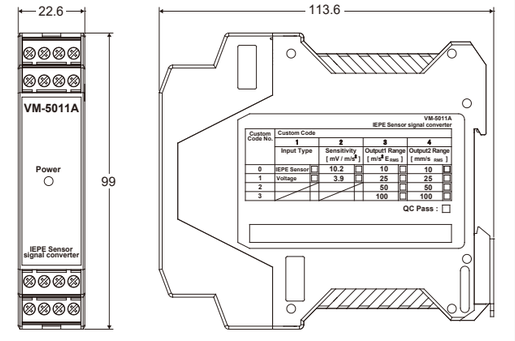


Specifications

Item	Specification	
Input range	0 to 500 m/s^2	
Measuring range of frequency	E acceleration	10 Hz to 1 kHz Band pass filter: 500 Hz to 10 kHz
	Velocity	10 Hz to 1 kHz (ISO 2954: 2012 Filter characteristics compliant)
Measuring range*	E acceleration	□ 10 m/s^2 E rms ■ 50 m/s^2 E rms □ 25 m/s^2 E rms □ 100 m/s^2 E rms
	Velocity	□ 10 mm/s rms ■ 50 mm/s rms □ 25 mm/s rms □ 100 mm/s rms
DC output*	■ 4-20 mA (Load 500 Ω or lower) □ 0-10 V (Load 100 kΩ or lower)	
AC output	0-1 Vrms (Load100 kΩ or lower)	
Linearity	DC出力	Within ±3%F.S
	AC出力	Within ±5%
Operating temperature/humidity range	0 to 50˚C, 95% RH or less (without freezing or condensing)	
Suitable cable of terminal block	0.2 to 2.5 mm^2 (single wire/standard wire) (AWG12 to24)	
Power supply of converter	DC24 V ±10% 3 W or less	
Size	22.6 (W) × 99 (H) ×113.6 (D) mm (Excluding protrusions)	
Mass	Approx.150 g	
Case material	Resin	

*■means factory default setting

Outward dimensions



振動監視装置

DC4 – 20 mA Output Accelerometer

VP-420/VP-421/VP-422

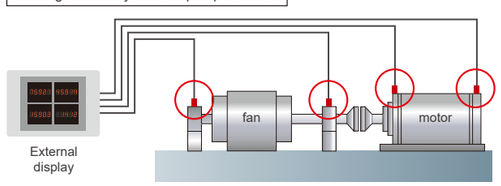
No amplifier unit required

Measurements of acceleration or velocity are provided for easy monitoring of abnormality on bearings or imbalance.

Features

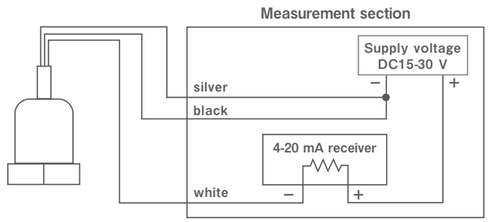
- Small size, light weight
- Eliminate necessity of alarm controllers
- Wide variety of lineup corresponding to various field environment
- Choice of studs for easy setup

Application example



By direct connection of sensor cables to external displays, trend monitoring is available.

Basic connection example (common for all types)



Specifications

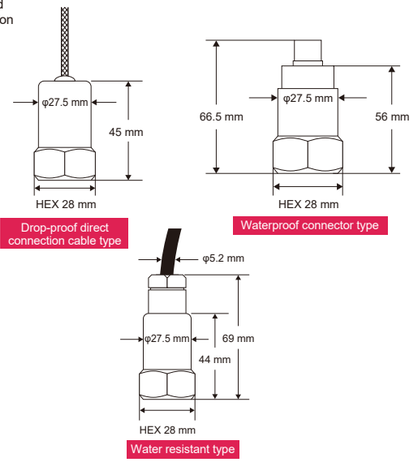
Item	Velocity(current output)VP-420	Velocity(current output)+ Acceleration waveform(voltage output)VP-421	Acceleration (current output) VP-422
Frequency range	10 Hz to 1 kHz, ±5% (ISO10816)	10 Hz to 1 kHz, ±5%(ISO10816)	10 Hz to 5 kHz, ±3 dB
Measurement range	10,20,25,50,100 mm/s rms	10,20,25 mm/s rms	9.8,19.6, 49,98, 980 m/s^{2}rms
Output sensitivity	4 – 20 mA/0 – full scale	4 – 20 mA/0 – full scale Acceleration wavefom: 12 mV / (m/s^2)	4 – 20 mA/0 – full scale
Voltage supply	DC15 to 30 V, 30mA or more		
Warm-up time	Approx. 30 seconds		
Output impedance	DC24 V, maximum 600 Ω		
Insulation resistance	DC500 V, 100 MΩ or less		
Operating temperature range	-25 to 90˚C		
Cable length	Standard 5 m (1,000 m)		
Mass	Approx. 140g to 120g (Cable is not included)		
Protection structure	Drop-proof direct connection cable type: IP65 (dust-proof, drop-proof) Waterproof connector type: IP67 (dust-proof, waterproof) Water resistant type: IP68 (dust-proof, perfect waterproof: water depth 100 m, 10 bar)		

Please inform us requested full scale value and cable length. Acceleration output + acceleration waveform output type is also available.

▶ Option

Model	MS-AS001	MS-AS002	MS-AS003	MS-AM005	MS-AC011-5
Item	Quick fit (glue stud)	Quick fit (M8 male)	Quick fit (M6 male)	Quick fit (magnet)	Connector cable 5 m applied to water proof type
Image	sensor side / attachment side	sensor side / attachment side	sensor side / attachment side	sensor side / attachment side	——

Outward dimension



Vibration Switch

VM-90A

Compact popular type

A popular vibration monitor specialized in low cost and control function. It is suitable for automatic control when abnormal vibration occurs.

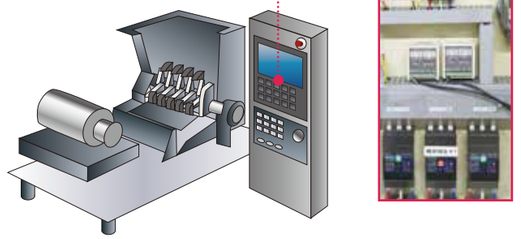
Features

- Low cost
- Changeover type for measurement mode and range
- Two step alarm setting, level outputs available
- Applicable with intrinsic safety proof pickups

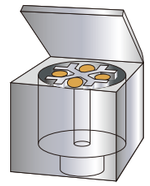
VP-A52IW

Application example

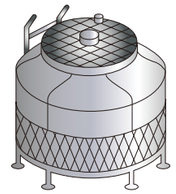
Machine tool, crusher etc.



Centrifugal separator



Cooling tower



Stop operation in case of abnormality installed on or inside machine tools or crushers etc.

Specifications

Item	Specification	
Frequency range	Acceleration	8 Hz to 8 kHz, -3 dB (10 Hz to 5 kHz, ±1dB)
	Velocity	10 Hz to 1 kHz, ±1.5 dB
	Displacement	10 Hz to 300 Hz, ±1.5 dB
Measurement range	Acceleration	10,100 m/s^2
	Velocity	10, 100 mm/s rms
	Displacement	100, 1,000 μmp-p
Alarm output	Individual level setting (upper 2 steps): 10 to 100% Individual 1c contact: maximum capacity DC30 V, 1A Delay time setting: 1 to 10 seconds Automatic reset	
Level output	DC4 – 20 mA (maximum load resistance 300 Ω)	
Monitor output	AC3 VP-P full scale DC2 V full scale	
Power supply	AC100 V±10 V, 47 to 63 Hz	
Power consumption	4 VA or smaller	
Operating temperature / humidity range	0 to +50˚C, 35 to 95% RH (non-condensing)	
Mass / Size	74 (W) × 72 (D) × 90 (H) mm/approx. 250 g	

▶ Standard composition

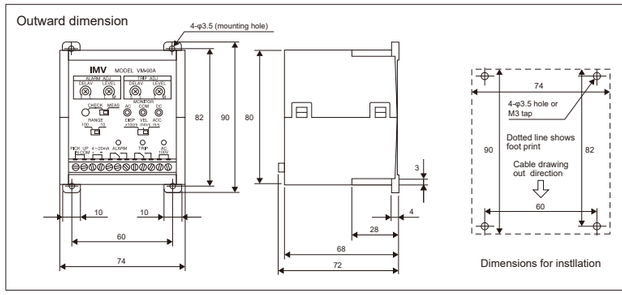
Item	Notes
Sensor (VP-A52IW)	Piesoelectric sensor (see page 22)
Sensor cable	5 m long cable with a pick up connector and waterproof cap
Standard accessories	• screw for pickup attachment M6, hexagonal hole • sems screw for main body installation • hex key wrench • instruction mannual (with test certification)

Other lengths available on request. (Maximum length is 200m) Please refer to page 25 about the cable length.

▶ Option

Item	Notes
Mechanical filter (MCF-6)	Prevention of incorrect operation on displacement / velocity measurement. Elimination of high frequency component.

Outward dimension



Vibration Signal Converter

VM-90D series

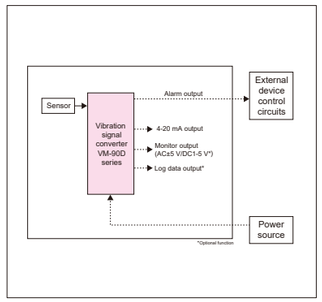
Entry level model for vibration monitoring

A standard monitoring device which has the standard functions, such as indication of vibration value, signal output and alarm contact output.

Features

- Low price
- Compact size
- Changeover type for measurement mode and range

System composition



Suitable sensors

Type	VP-3144C/D	VP-3213AC/AD (Horizontal only)	VP-3223AC/AD (Vertical only)	VP-A52 IW	HS-100I
Sensor type	Electrodynamic velocity type			Piezoelectric accelerometer	
Sensitivity	10 mV/ (mm/s)	17.5 mV/ (mm/s)		5 mV/ (m/s^2)	50mV/G
Natural frequency	14 Hz	4.5 Hz		35,000 Hz	24,000 Hz
Operating temperature range	-20 to+80℃	-20 to+70℃		-30 to+110℃	-20 to+80℃
Structure	Drop-proof (Equivalent to IP32)			Isolated/Water-proof	Safe and explosion proof (Ex ia II C T4 Ga)
Outward appearance		 Horizontal only	 Vertical only		
Notes	Suitable for monitoring of medium frequency displacement or velocity	Suitable for monitoring of low frequency displacement or velocity		Suitable for monitoring of acceleration	Insulated

*Other sensors for high temperature or waterproof are also available. Please contact us for details.

Specifications

Item		Specification
Signal output	Conversion output	DC4-20 mA, 1 output (response time 3 seconds)*1
	Monitor output	AC ±5 V, FS ± 5% (For quick check)*3 DC 1 to 5 V, FS ± 5% (Option)
Alarm output	Alarm contact	1 step 1a contact, AC 125 V to 0.5 A, DC 30 V to 1A (resistive load)
	Alarm setting range	0 to 100% of full scale arbitary setting (in 1% step)*2
	Alarm action	Operation that activates when time passes alarm delay time after vibration level exceeds alarm set level. (automatic reset) Initial alarm delay time setting 5 sec. (3 - 99 sec.: 1 sec. step)
Indication function	Main body	Red 7 segment LED (4 digit indication)
	Indicator	Vibration value: 5-step switching indication depends on the setting mode Blink for 120% over range full scale Alarm setting value (%) : 0 to 100 for full scale*2 Pickup sensitivity value (%) : 80 to 120 for standard sensitivity
Operating temperature range		-5 to + 55℃ 30 to 90% RH (Non-condensing)
Power supply		AC100 V ± 10% 50/60 Hz ± 2 Hz
Power consumption		Less than 10 VA
Mounting		On the wall or Din rail (Din rail connector is detachable)
Terminal board		M3.5 screw on the back panel
Material		Plastic
Size/Mass		50 (W) × 127 (D) × 80 (H) mm/Approx. 300 g

*1 Can be changed by the customized software *2 Setting at 0% disable a alarm function *3 Only for quick check of waveform

VM-90DA (Applicable to pre-amplifier build-in type sensor)

(VP-A52IW, HS-100I)

Measurement mode	Item	Specifications
Acceleration*5	Measurement range	10, 20, 50, 100, 200 (m/s^2 rms)
	Frequency range	10 to 4 kHz ± 1 dB, 10 to 10 kHz, +1 dB, -3 dB
Velocity*5	Measurement range	5, 10, 20, 50, 100, (mm/s rms)
	Frequency range	10 to 1 kHz ± 1 dB, -2 dB
H function*5	Measurement range	10, 20, 50, 100, 200 (m/s^2 rms)
	Frequency range	DC to 1 kHz (Envelope detection of 2 kHz to 15 kHz)
H function CF*5	Measurement range	5, 10, 20, 50, 100
	Frequency range	DC to 1 kHz (for peak/rms of H function)

VM-90DV (Applicable to medium frequency sensor)

(VP-3144C/D)

Measurement mode	Item	Specifications
Velocity*5	Measurement range	5, 10, 20, 50, 100 (mm/s rms)
	Frequency range	10 to 1 kHz ±1 dB
Displacement*5	Measurement range	50, 100, 200, 500, 1,000 (μmp-p)
	Frequency range	10 to 500 Hz ± 1 dB

VM-90DVL (Applicable to low frequency sensor)

(VP-3123AC/AD, VP-3223AC/AD)

Measurement mode	Item	Specifications
Velocity*5	Measurement range	5, 10, 20, 50, 100 (mm/s rms)
	Frequency range	5 to 500 Hz ± 1 dB
Displacement*5	Measurement range	50, 100, 200, 500, 1,000 (μmp-p)
	Frequency range	5 to 500 Hz ± 1 dB

*5 Measurement mode is switchable by the switch on the front panel. Measurable up to 20% of range over. Error is 1% or less.

Vibration Switch

VM-90M series

Analog type which has lots of achieved hazard prevention

Widely used and long-selling device.

Features

- Corresponds to all kinds of sensor
- Easy installation : stationary, panel housed or wall-mounted
- Customizable power supply, alarm delay time and so on

VM-90MEV

Suitable sensors

Type	VP-3144C/D	VP-3213AC/AD (Horizontal only)	VP-3223AC/AD (Vertical only)	VP-A52IW	VP-3133 HEX/VEX	VP-3134 AEX
Sensor type	Electrodynamic velocity type			Piezoelectric accelerometer	Electrodynamic velocity type	
Sensitivity	10 mV/ (mm/s)	17.5 mV/ (mm/s)		5 mV/(m/s^2)	17.5 mV/ (mm/s)	10mV/ (mm/s)
Natural frequency	14 Hz	4.5 Hz		35,000 Hz	4.5 Hz	14 Hz
Operating temperature range	-20 to +80℃	-20 to+70℃		-30 to +110 ℃	-20 to +70 ℃	
Structure	Drop-proof (Equivalent to IP32)			Isolated/Water-proof	Flame-proof (EX d II BT4Gb)	
Outward appearance		 Horizontal only	 Vertical only			
Notes	Suitable for monitoring of medium frequency displacement or velocity	Suitable for monitoring of low frequency displacement or velocity		Suitable for monitoring of acceleration	Suitable for monitoring of low frequency displacement or velocity	Suitable for monitoring of medium frequency displacement or velocity

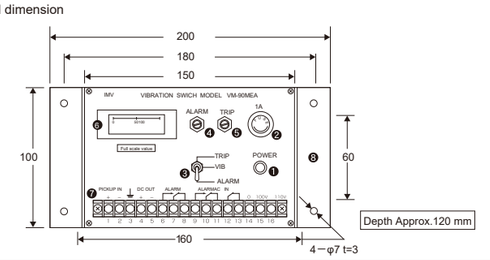
*Another sensor for high temperature or waterproof are also available. Please contact us for details.

Specifications

Type	Monitor for displacement	Monitor for velocity	Monitor for acceleration
	VM-90 MED	VM-90 MEV	VM-90 MEA
Frequency range	15 to 500 Hz -3 dB, +0.5 dB 20 to 500 Hz ± 0.5 dB	15 to 1,000 Hz -3 dB, +1 dB 20 to 850 Hz ±1 dB	10 to 8,000 Hz ±3 dB 20 to 5,000 Hz ±1 dB
Measurement range (full scale)*1	Select from 0 to 20 μmp-p, 0 to 50 μmp-p, 0 to 100 μmp-p, 0 to 200 μmp-p, 0 to 500 μmp-p	Select from 0 to 1 mm/s, 0 to 2 mm/s, 0 to 5 mm/s, 0 to 10 mm/s, 0 to 20 mm/s, 0 to 50 mm/s	Select from 0 to 1m/s^2, 0 to 2m/s^2, 0 to 5 mm/s^2, 0 to 10 m/s^2, 0 to 20m/s^2, 0 to 50m/s^2, 0 to 100 m/s^2
Alarm step	2 steps		
DC output (for recorder)	4 to 20 mA (at the load 0 to 300 Ω) 1 to 5 V (100 kΩ or more, 250 Ω connection to outside		
Alarm action	Activated over alarm setting value (time constant: approx. 3 seconds)		
Aram setting range	Possible to set 10 to 100% of full scale		
Alarm contact	1C contact for each alarm		
Alarm contact capacity	AC250 V 3.0A/DC24 V, 3.0 A (at resistive load)		
Alarm reset	Automatic		
Operating temperature / humidity range	0 to 50℃ 0 to 85% RH (Non-condensing)		
Power supply	AC100 V or 110 V *2 (+10%/ -15%), 50/60 Hz		
Power consumption	15 VA or less		
Size / Mass	200 (W) × 103 (D) × 105 (H) mm (excluding connectors etc.)/2 kg		

*1 Please inform us the measurement range *2 AC 200/220 V is optional

Outward dimension



Λ-Vibro

VM-8018/VM-8018-UT

For recording valuable vibration data!

Generate vibration diagnosis and analysis results in CSV format files. We support the construction of a full-fledged condition monitoring system using IoT.

Features

- Vibration analysis by edge computing
- Simultaneous measurement and recording of waveforms, FFT, and OA (trend) at arbitrary intervals
- Supports various sensor inputs
- Vibration measurement by external trigger/time reservation

Features

Supports various sensor

In addition to the general acceleration sensor for rotating machinery (VP-100M), it also supports the sensor for low-speed rotating machinery (VP-8013) and voltage input, and can capture parameters other than vibration.

Data storage suitable for diagnosis

Acceleration, velocity, displacement, and envelope acceleration Peak/rms values are periodically saved to a file.FFT and acceleration waveforms are also sampled at a maximum sampling rate of 51.2 kHz to record detailed data.

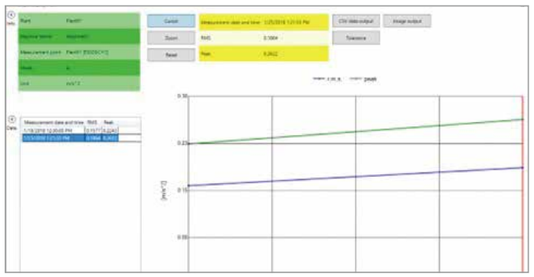
Easy data access

Uses Windows®10 IoT Core as the OS*. Folders and files in Lambda Vibro can be accessed from the same network. The file is in CSV format, so you can check the data directly. *VM-8018 only

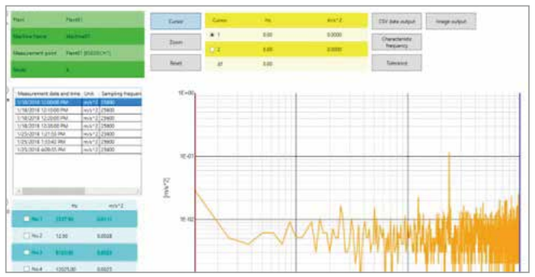
Option Database software DS-8018

Manually captures and organizes data from multiple lambda vibros to support trend management and precise diagnosis.

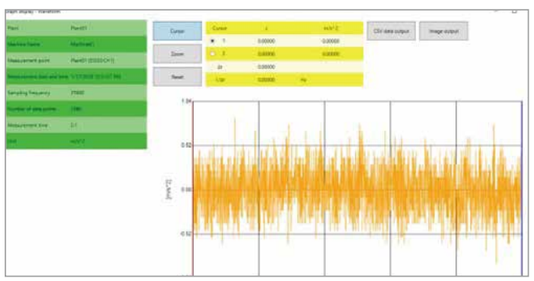
OA

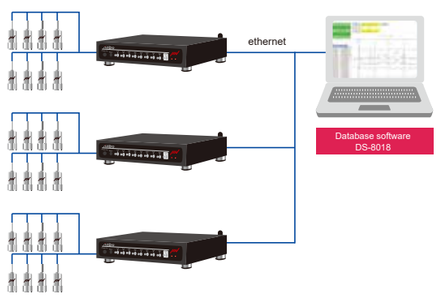


FFT



Waveform



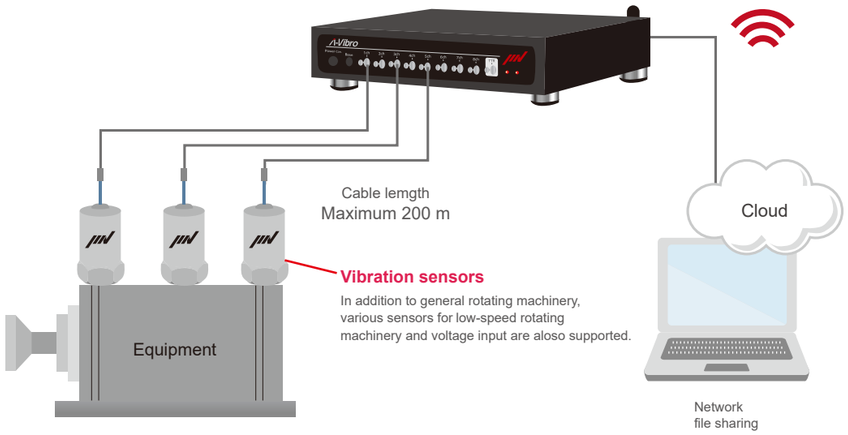


Suitable sensors

Model	VP-8021A	VP-100
Sensor type	Base insulated voltage drive type	Piezoelectric Compression type (Built-in pre-amplifier)
Acceleration sensitivity	3.9 mV/(m/s²) ±5%	100 mV/g
Vibration frequency response	20 Hz to 3 kHz ±1 dB	2 Hz to 10 kHz
	10 Hz to 8 kHz ±3 dB	-
	10 Hz to 10 kHz ±4 dB	-
Operating temperature range	-30℃ to +120℃	-55 to 140℃
Sensitivity change due to temperature	±3% 25℃ standard	-
IEPE power supply	3.5 mA Maximum 24 V	0.5 to 8 mA（DC18 to 30 V）
Note	Standard type	Low cost type

VP-8021A　　VP-100

System composition



Specifications

Item	VM-8018	VM-8018-UT
Analog channel	8 ch（Maximum ± 15 V）	
Sampling resolution	16 Bit（Serial type）	
Sampling frequency	400 Hz – 51.2 kHz（Supports simultaneous sampling）	
Connected sensor	VP-100M, VP-8021C, VP-8013	
ICP output current	3.5 mA/24 V	
Trigger channel	1 ch（input）Maximum 24 V	
Channel terminal shape	HD-BNC (MicroBNC)	
Function port	USB2.0 typeB（Host mode） Wired LAN (file sharing)	
Wireless connectivity	WLAN 802.11 b/g/n（file sharing）	
Installed OS	Windows®10 IoT Core	Linux4.14.96 (linaro-alip)
LED display	red green, orange blue（2LED）	
Power supply	AC100 – 240 V（AC adapter）	
Size/Mass	63 (H) × 250 (W) × 210 (D) mm/2.5 kg (excluding connectors etc.)	
Operating temperature range	-10 – 50℃	
Storage capacity	32GB (standard), 64GB (option), 128GB (option)	32GB

Measurement specifications

Item	VM-8018	VM-8018-UT
Measurement object	Acceleration: m/s², gal, G Velocity (calculated value): mm/s Displacement (calculated value): μm Voltage: V, mV, μV	Acceleration: m/s², gal, G Velocity (calculated value): mm/s Displacement (calculated value): μm Voltage: V, mV
Sampling rate	51200sps, 25600sps, 12800sps, 10240sps, 6400sps, 5120sps, 3200sps, 2560sps, 2048sps, 1600sps, 1280sps, 1024sps, 800sps, 640sps, 512sps, 400sps	
Voltage range	±2.56 V, ±5.12 V, ±10.24 V, ±20.48 V (Measurement range is ±15V.)	
Measurement time	0.1 s – 40.9 s	0.1 s – 20.0 s
Trigger	Measurement start by external trigger and reserved trigger	

MEMO

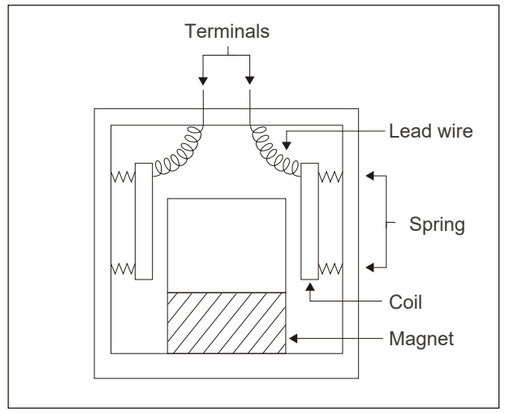
Vibration Sensors

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, selection of most suitable sensor is very important.

Electrodynamic velocity sensor >> P17
Piezoelectric sensor >> P21

Electrodynamic velocity sensor

Principle of reciprocal pendulum type sensor is to induce voltage by reciprocal motion of the seismic mass with a coil in the magnetic field being suspended by a diaphragm or coil spring. Because of its high sensitivity and advanced linearity, it is suitable for detection of malfunction or deterioration of rotational machineries. Due to its structure, mounting should be done carefully for its direction or angle.

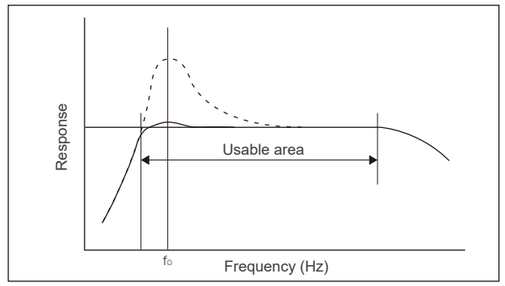


- High sensitivity, stable performance, advanced linearity in wide amplitude range
- Relatively large output
- Because of small internal resistance, long cable can be used.
- External power supply is not necessary (self -power generation)
- Suitable for sleeve bearing vibration measurement

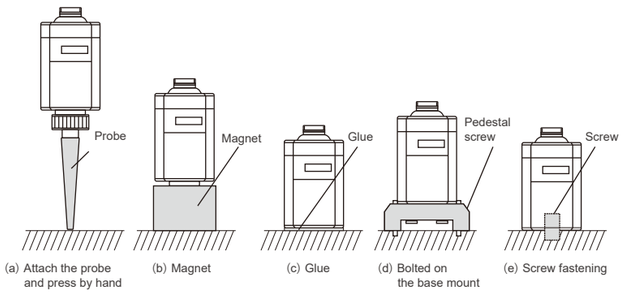
Features

[Frequency response]

The upper frequency limit is to be difined by the response of the low-pass filter. The lower frequency limit depends on its own natural frequency. Use in the frequency range lower such frequency is possible by damping the peak of the resonance.

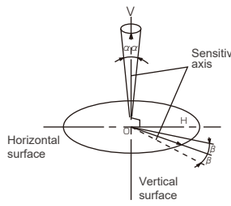


Fixing methods



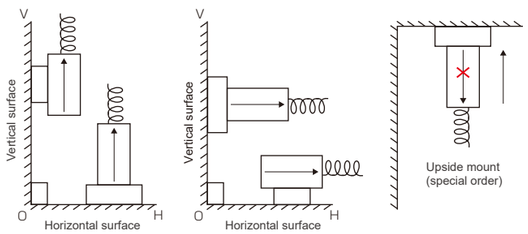
▶ Fixing angle

The table below shows the fixing angle of sensor whose natural frequency is 14 Hz or 4.5 Hz.



Angle	Applicable sensor
α≦5° β≦5°	Medium frequency (Natural frequency 14 Hz)
α≦2° β≦2°	Low frequency (Natural frequency 4.5 Hz)

▶ Fixing direction



Both (a) and (b) are available for the sensor whose natural frequency is 14 Hz, but the sensor whose natural frequency is 4.5 Hz is limited to any one of the (a) or (b). Can not be fixed downwardly. Special fixture is needed to fix upwardly.

Electrodynamic velocity sensor

VP-3144C/D — Linear pendulum type

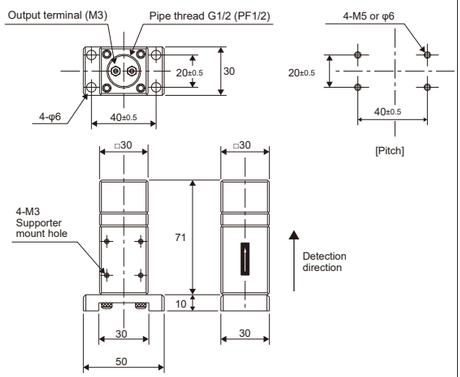
Medium frequency


Type C

■ **Specifications**

Sensitivity	10 mV/(mm/s)
Detection axis	Horizontal or vertical
Natural frequency	14 Hz
Frequency range	10 to 1,000 Hz*1
Maximum allowable acceleration	100 m/s²
Maximum measurable displacement	1,000 μmp-p
Operating temperature range	-20 to +80℃
Structure	Drop-proof (Equivalent to IP32)
Cable connection	Pipe thread(type C), direct connection of clamp(type D)
Suitable cable	2 core shielded cable
Weight	200 g
Case material	Aluminum

Outward dimensions



Type C

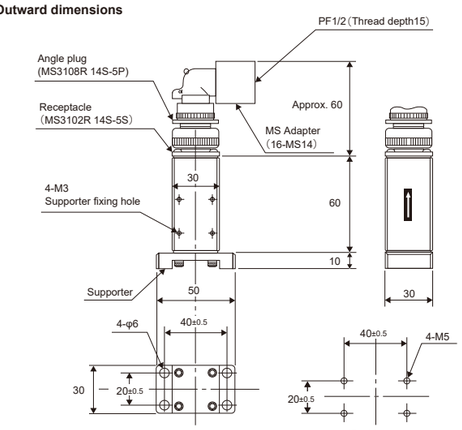
VP-3144F — Linear pendulum type

Medium frequency

■ **Specifications**

Sensitivity	10 mV/(mm/s)
Detection axis	Horizontal or vertical
Natural frequency	14 Hz
Frequency range	10 to 1,000 Hz*1
Maximum allowable acceleration	100 m/s²
Maximum measurable displacement	1,000 μmp-p
Operating temperature range	-20 to +80℃
Structure	Drop-proof (Equivalent to IP32)
Cable connection	MS connector
Suitable cable	2 core shielded cable with connector
Weight	300 g
Case material	Aluminum

Outward dimensions



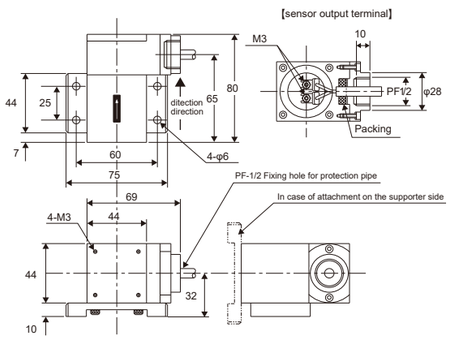
VP-3144W — Linear pendulum type

Medium frequency | Waterproof

■ **Specifications**

Sensitivity	10 mV/(mm/s)
Detection axis	Horizontal or vertical
Natural frequency	14 Hz
Frequency range	10 to 1,000 Hz*1
Maximum allowable acceleration	100 m/s²
Maximum measurable displacement	1,000 μmp-p
Operating temperature range	-20 to +80℃
Structure	Watrproof (Equivalent to IP66)
Cable connection	Pipe thread
Suitable cable	2 core shielded cable
Weight	600 g
Case material	Aluminum

Outward dimensions



VP-3374C/D — Linear pendulum type

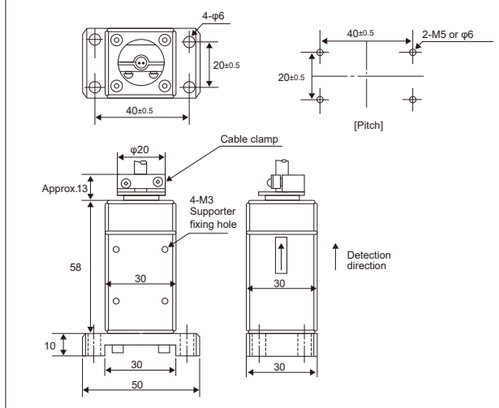
Medium frequency | High temperature


Type D

■ **Specifications**

Sensitivity	10 mV/(mm/s)
Detection axis	Horizontal or vertical
Natural frequency	14 Hz
Frequency range	10 to 1,000 Hz*1
Maximum allowable acceleration	100 m/s²
Maximum measurable displacement	1,000 μmp-p
Operating temperature range	-30 to +105℃
Structure	Drop-proof (Equivalent to IP32)
Cable connection	Pipe thread(type C), direct connection of clamp(type D)
Suitable cable	2 core shielded cable
Weight	200 g
Case material	Aluminum

Outward dimensions



Type D

*1 Frequency range is limited by the range of connedted monitoring device.

VP-3544 C/D

Linear pendulum type

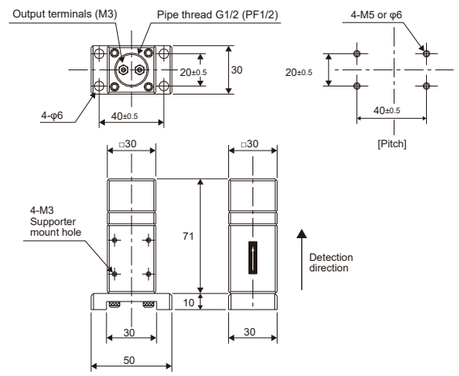
Medium frequency | High temperature

Type C

■ Specifications

Sensitivity	10 mV/(mm/s)
Detection axis	Horizontal or vertical
Natural frequency	14 Hz
Frequency range	10 to 1,000 Hz*1
Maximum allowable acceleration	100 m/s²
Maximum measurable displacement	1,000 μmp-p
Operating temperature range	-30 to +130℃
Structure	Drop-proof (Equivalent to IP32)
Cable connection	Pipe thread(type C), direct connection of clamp(type D)
Suitable cable	2 core shielded cable
Weight	200 g
Case material	Aluminum

Outward dimensions



Type C

VP-3354A /VP-3364A

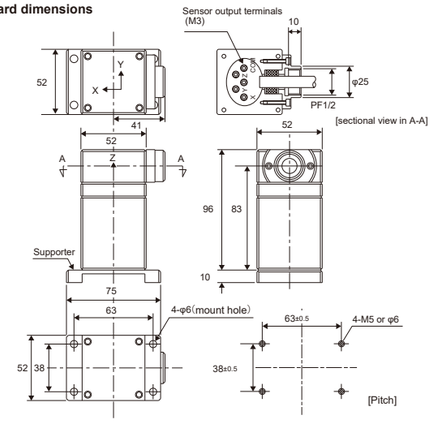
Linear pendulum type

Medium frequency | 2/3 direction | Waterproof

■ Specifications

Sensitivity		10 mV/(mm/s)
Detection axis	VP-3354A (2direction)	Horizontal×2 or Horizontal & Vertical
	VP-3364A (3direction)	Horizontal×2 & Vertical×1
Natural frequency		14 Hz
Frequency range		10 to 500 Hz*1
Maximum allowable acceleration		100 m/s²
Maximum measurable displacement		1,000 μmp-p
Operating temperature range		-20 to +80℃
Structure		Waterproof (Equivalent to IP66)
Cable connection		Direct connection of clamp
Suitable cable		3 or 4 core shielded cable
Weight		700 g
Case material		Aluminum

Outward dimensions



VP-3134AEX

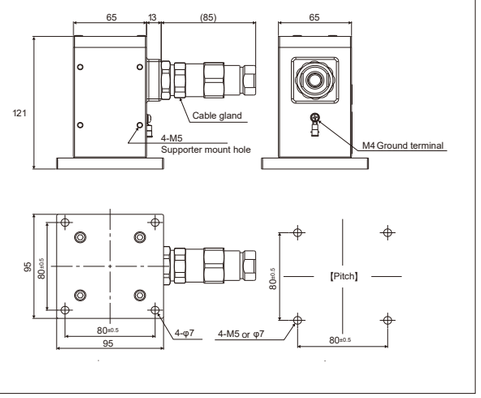
Linear pendulum type

Medium frequency | Flame-proof

■ Specifications

Sensitivity	10 mV/(mm/s)
Detection axis	Horizontal or vertical
Natural frequency	14 Hz
Frequency range	10 to 500 Hz*1
Maximum allowable acceleration	98 m/s²
Maximum measurable displacement	1,000 μmp-p
Operating temperature range	-20 to +70 ℃
Structure	Flame-proof (EX d Ⅱ BT4Gb)
Cable connection	Pressure-resistant packing
Suitable cable	2 Core shielded cable
Weight	2,300 g
Case material	Aluminum

Outward dimensions



VP-3213AC/AD (Horizontal only) VP-3223AC/AD (Vertical only)

Linear pendulum type

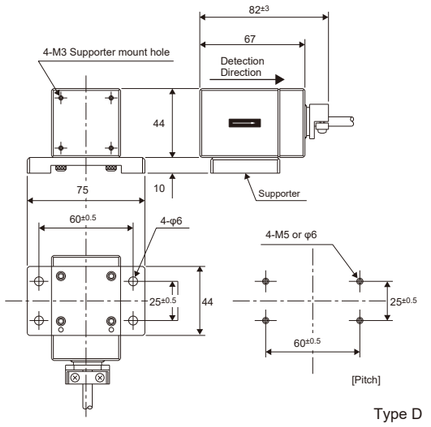
Low frequency

Type C

■ Specifications

Sensitivity	17.5 mV/(mm/s)
Detection axis	VP-3213(Horizontal only), VP-3223(Vertical only)
Natural frequency	4.5 Hz
Frequency range	5 to 500 Hz*1
Maximum allowable acceleration	30 m/s²
Maximum measurable displacement	1,000 μmp-p
Operating temperature range	-20 to +70℃
Structure	Drop-proof (Equivalent to IP32)
Cable connection	Pipe thread(type C), direct connection of clamp(type D)
Suitable cable	2 Core shielded cable
Weight	500 g
Case material	Aluminum

Outward dimensions



Type D

*1 Frequency range is limited by the range of connedted monitoring device.

VP-3213AW (Horizontal only) VP-3223AW (Vertical only)

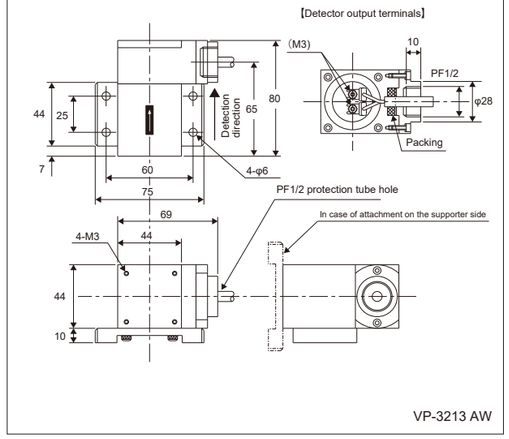
Linear pendulum type

Low frequency | Water-proof

■ Specifications

Sensitivity	17.5 mV/(mm/s)
Detection axis	VP-3213(Horizontal only), VP-3223(Vertical only)
Natural frequency	4.5 Hz
Frequency range	5 to 500 Hz*1
Maximum allowable acceleration	30 m/s²
Maximum measurable displacement	1,000 μmp-p
Operating temperature range	-20 to +70℃
Structure	Waterproof (Equivalent to IP66)
Cable connection	Direct connection of clamp
Suitable cable	2 core shielded cable
Weight	600 g
Case material	Aluminum

Outward dimensions



VP-3213 AW

VP-3133HEX (Horizontal only) VP-3133VEX (Vertical only)

Linear pendulum type

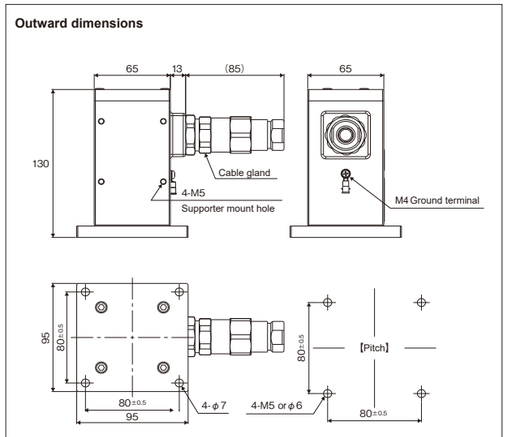
Low frequency | Flame-proof

Type V

■ Specifications

Sensitivity	17.5 mV/(mm/s)
Detection axis	VP-3133H(Horizontal only), VP-3133V(Vertical only)
Natural frequency	4.5 Hz
Frequency range	5 to 500 Hz*1
Maximum allowable acceleration	29 m/s²
Maximum measurable displacement	1,000 μmp-p
Operating temperature range	-20 to +70℃
Structure	Flame-proof (EX d Ⅱ BT4Gb)
Cable connection	Pressure-resistant packing
Suitable cable	2 core shielded cable
Weight	2,400 g
Case material	Aluminum

Outward dimensions

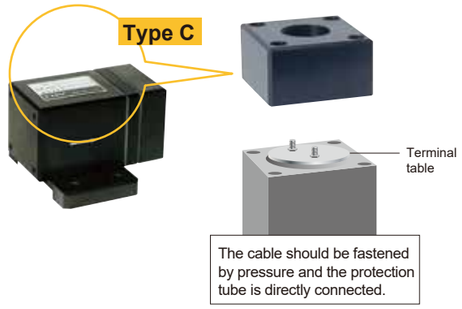


*1 Frequency range is limited by the range of connedted monitoring device.

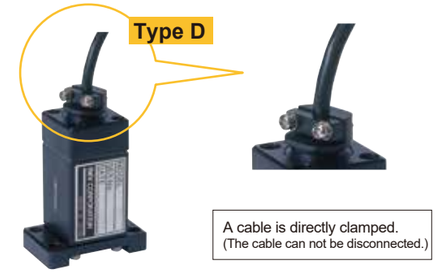
Comment

The difference between **C** and **D** is the shape of cable connection.

Type C : Pipe thread type



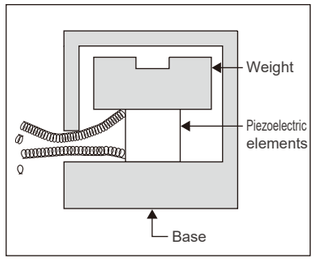
Type D : Direct connection type



Piezoelectric sensor (Charge type)

Compression type

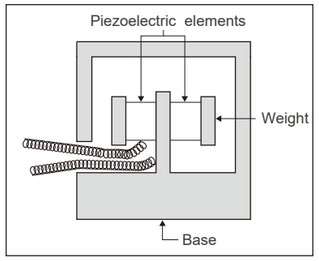
Compression type has a piezoelectric element fastened by a screw between a piece of weight and the base. Measurement of pretty large shock is possible because of its advanced mechanical strength. The resonant frequency is high for its sensitivity. Therefore, the accelerometers of this type can be used not only for general applications but also for measurements of 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 operating temperature range

Shear type

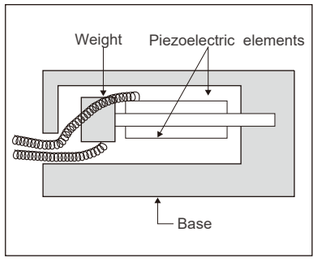
Shear type is constructed so that each piezoelectric element has shear that is proportional to applied acceleration between the poles. It is useful for low frequency vibration measurement even in the environments of large temperature change because it is hard to be effected by the pyroelectricity. Furthermore,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

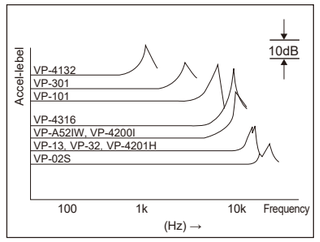
Bending type

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, for example.



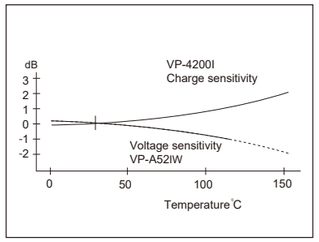
- Small size, light weight, high sensitivity
- Stable works, advanced linearity

Features



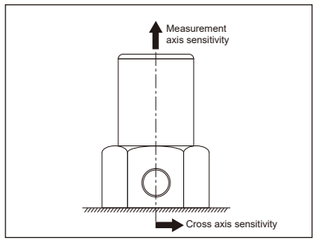
[Frequency response]

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]

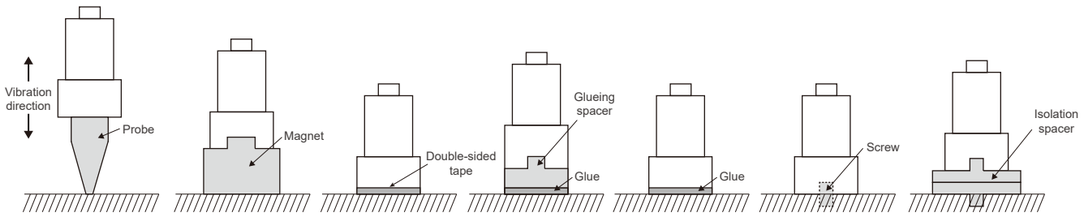
Acceleration sensitivity of a piezoelectric element is effected by temperature. While such effect is dependent on material and structure, high temperature gives larger capacitance, higher charge sensitivity and smaller voltage sensitivity generally.



[Cross axis sensitivity]

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

Fixing methods



*Bending type should be of stationary or fixed by glue/double-sided adhesive tape.

Piezoelectric sensor

VP-43IW

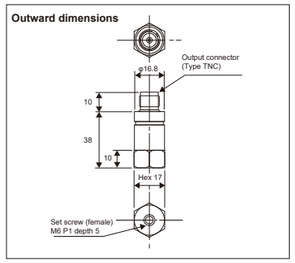
Charge/ compression type

Drip proof

■ Specifications

Resonance frequency	> 29,000 Hz
Frequency range	fc*1 to 5,000 Hz ±1 dB
Charge sensitivity	5.0 pC/(m/s²) ±10 %
Capacitance	1,200 pF ±20%
Maximum arrowable acceleration	5,000 m/s²
Operating temperature range	-30 to +150°C
Structure	Insulative and drip proof (Equivalent to IP54*2)
Cable connection	Upward TNC connector
Weight	53 g
Material	Stainless steel (SUS303)

Outward dimensions



VP-4201H

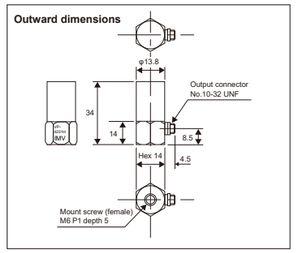
Charge/ compression type

High temperature

■ Specifications

Resonance frequency	> 23,000 Hz
Frequency range	fc*1 to 5,000 Hz ±1 dB
Charge sensitivity	5.0 pC/(m/s²) ±20%
Capacitance	1,000 pF
Maximum arrowable acceleration	16,000 m/s²
Operating temperature range	-20 to +250°C
Cable connection	Sidewise 10-32 threaded connector
Weight	42 g
Material	Stainless steel (SUS304)

Outward dimensions



VP-4200I

Charge/ share type

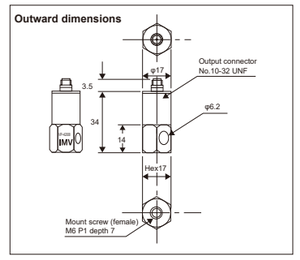
Isolated

General type

■ Specifications

Resonance frequency	> 25,000 Hz
Frequency range	fc*1 to 7,000 Hz ±1 dB
Charge sensitivity	5.0 pC/(m/s²) ±10%
Capacitance	1,000 pF
Maximum arrowable acceleration	100,000 m/s²
Operating temperature range	-20 to +120°C
Cable connection	Upward 10-32 threaded connector
Weight	45 g
Material	Stainless steel (SUS303)

Outward dimensions



VP-A52IW

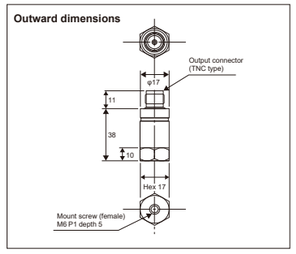
Built-in pre-amplifier/ compression type

Isolated Drip-proof

■ Specifications

Resonance frequency	> 35,000 Hz
Frequency range	3 to 10,000 Hz ±3 dB
Voltage sensitivity	5 mV/(m/s²) ±10%
Maximum measurable acceleration	700 m/s²
Power supply	0.5 to 10 mA constant current, voltage 12 to 30 V
Operating temperature range	-30 to +110°C
Structure	Insulative and water proof
Cable connection	Upward TNC connector
Weight	Approx. 49 g
Material	Stainless steel (SUS303)

Outward dimensions



VP-A12IW

Built-in pre-amplifier/ compression type

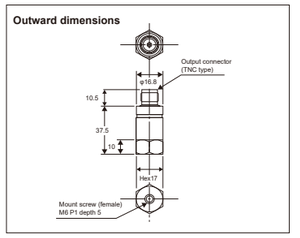
Isolated Drip-proof

Large acceleration

■ Specifications

Resonance frequency	> 50,000 Hz
Frequency range	3 to 10,000 Hz ±3 dB
Voltage sensitivity	1 mV/(m/s²) ±20%
Maximum measurable acceleration	3,500 m/s²
Power supply	0.5 to 5 mA constant current, voltage 12 to 30 V
Operating temperature range	-30 to +110°C
Structure	Insulative and drip proof (Equivalent to IP54*2)
Cable connection	Upward TNC connector
Weight	44 g
Material	Stainless steel (SUS303)

Outward dimensions



HS-100I

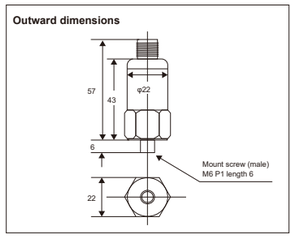
Built-in pre-amplifier/ Shear type

Intrinsic safety

■ Specifications

Resonance frequency	> 32,000 Hz
Frequency range	2 to 10,000 Hz ±10%
Voltage sensitivity	50 mV/G ±10%
Maximum measurable acceleration	1,568 m/s²
Power supply	0.5 to 8 mA constant current, voltage 15 to 30 V
Operating temperature range	-20 to +80°C
Structure	Instrinsic safety (Ex ia II C T4 Ga)
Cable connection	M12 connector
Weight	106 g
Material	Stainless steel (SUS303)

Outward dimensions



*1 fc: The value to be defined by the time constant of charge amplifier
*2 When using the dedicated cable

Piezoelectric sensor

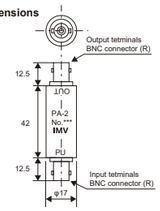
PA-2

Dual-line output charge amplifier

■ Specifications

Gain	-1 mV/pC ±2%
Power supply	0.5 to 5 mA constant current, voltage15 to 30 V
Frequency range	2 to 50,000 Hz (In the case of 1,000 pF)
Maximum output voltage	> 3.5 Vp
Output impedance	> 20 Ω
Operating temperature range	-20°C to +70°C (No freezing)
Noise threshold	> 20 μVrms
Cable connection	BNC connector
Weight	Approx. 30 g
Ground	Housing
Material	Aluminum

Outward dimensions



Mounting adaptor for piezoelectric accelerometer

Strong magnet
MH-201R
Isolated type with strong magnetic force

Strong magnet
(for spherical surface)
MH-203R

Strong magnet
MH-205R
Non-insulated type

Isolating spacer
IS-6
cuts noise from the object

Glueing spacer
AS-6
to be fixed by glue

Mechanical filter
MCF-6H
cuts excessive high frequency components

Cable assembries for piezoelectric accelerometer

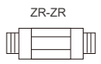
Accelerometer	Connector	Cable	Connector on equipment side	Code name
VP-4200I	10-32 screw plug (MTS)	HB-2C (200°C)	BNC plug	HB-2C/□/MB
			or 10-32 screw plug (MTS)	HB-2C/□/MM
VP-4201H	10-32 screw plug (heat resistant)	HR-2C (260°C)	BNC plug	HR-2C/□/MB
			or 10-32screw plug (MTS)	HR-2C/□/MM
VP-42IW	TNC screw plug	HB-3C(200°C)	BNC plug	HB-3C/□/TB
VP-A52IW VP-A12IW	TNC screw plug	RG-58AU(60°C)	BNC plug	RG-58AU/□/TB
			or no connector	RG-58AU/□/TF
	Rubber cap is attached			
HS-100I	M12 4 pole	LiF9YHC11YH	No connector	MS-AC266/□

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

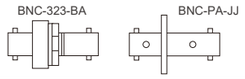
Interconnection conversion connector

BNC-P-C25J-A
Converts MTS to BNC

ZR-ZR
Converts MTS to MTS



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



Related Products

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

Vibrometer calibration system

VM-7144&VM-1970

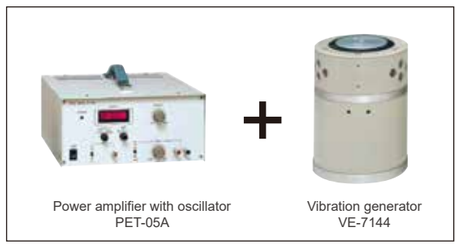
A wide frequency range electrodynamic vibration generator for vibrometer calibration.

Accurate calibration in the wide frequency range down from 2 Hz up to 20 kHz is available. It is suitable for calibration of electrodynamic, piezoelectric, noncontact vibration detectors being used at thermal, nuclear, hydraulic power stations.

Features

- Large specimen mounting table (φ82)
- A reference detector is built in the vibration generator VE-7144.
- Modification of the table to mount a detector is customizable.
- Horizontal table (PET-03H) is also usable.

VM-7144



Power amplifier with oscillator PET-05A

Vibration generator VE-7144

Vibrometer for reference VM-1970

▶ VM-7144

Item	Specifications
Excitation force	49 N
Maximum acceleration	49 m/s
Maximum displacement	2 mmp-p
Frequency range	2 to 20000 Hz
Frequency indication	5 digits (Digital indication)
Power supply	AC100 V 50 / 60 Hz

▶ VM-1970

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 passed through 1 kHz low-pass filter after processed by the 2 kHz to 15 kHz band-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 EQP: Equivalent peak estimated from average value	PEAK: Peak value P-HOLD: Held max. peak value
Level watching function	Alarm level step: 1 Step for every channel Setting: 0 to 110% for every range	Alarm output : 1a Relay contact output / ITTL level output for each individual channel 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)	
Ambient 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) × 290 (D) × 150 (H) mm (excluding connectors etc.) /Approx. 5 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 for further information.)

Warranty coverage

(1) If 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.

■ Field inspection

●Details
・Function inspection for each section by input of equivalent electronic signal
・Sensitivity calibration and performance check
・Replacement and maintenance of consumable goods
・Submission of report and test results
*An official quotation will be provided if repair or replacement of consumable goods are needed.

●Required days
In two weeks after a request

■ Inspection at our factry

●Details
・Inspection, unit calibration, operation check, total calibration by excitation
*An official quotation will be provided if repair or replacement of consumable goods are needed.

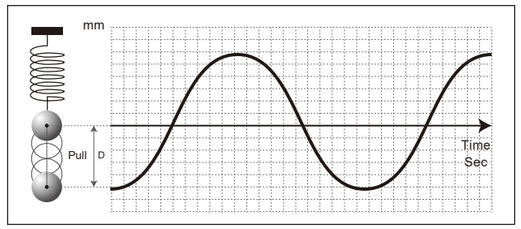
●Required days
10 days after receipt at our factory
*Required days may be varied as the case.

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.

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

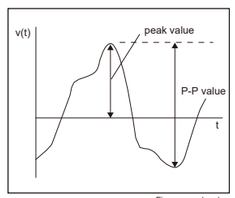


Figure : peak value

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.

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

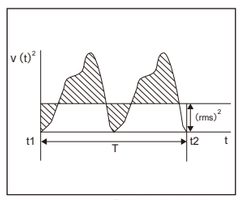


Figure : root mean square value

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）

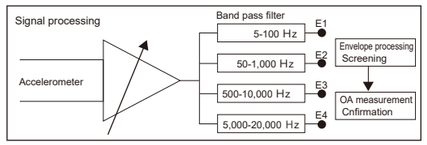
It is a sine peak assumed by the rms value.
For Sine wave, the relationship rms×√2=PEAK is valid. For a vibration monitoring system, there is a case that EPQ is monitored instead of the peak value itself avoiding to trigger the erroneous alarm by any accidental signal.

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.

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.

Objective machinery is classified into two major groups.

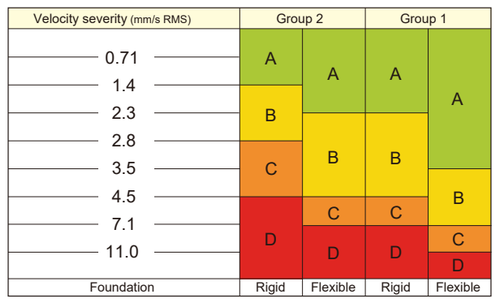
Group 1

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)

Section 3 Vibration Monitoring System

Vibration monitoring system is to monitor vibration using pickups or accelerometers fixed on the object.
Please pay attention the following points for fixing such vibration detectors.

1 Installation environments

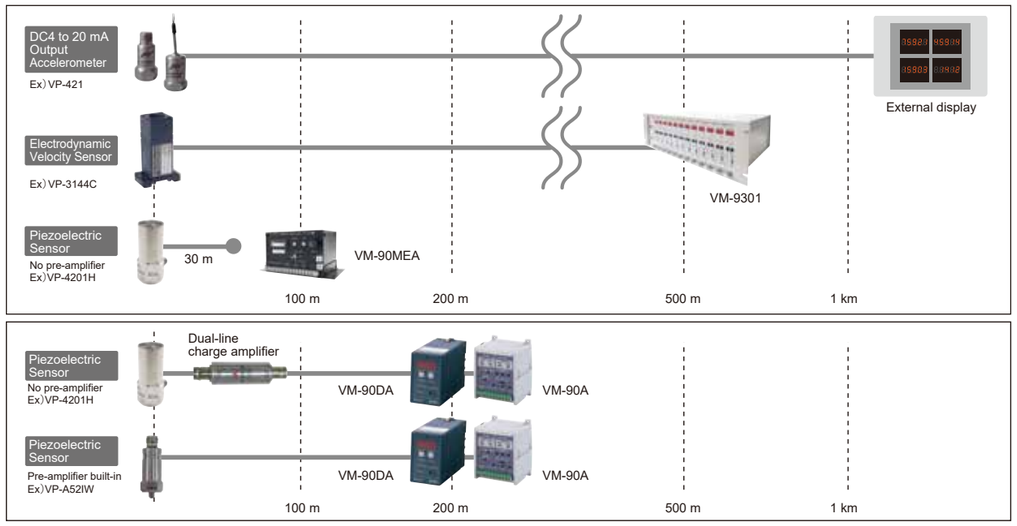
Sensors

- Water drop/Rain ••• For outdoor installation, use of water protection case is recommended.
- Temperature ••• For use out of -10 to 60 ˚C temperature range, make sure about the specified usable range.
- Flame-proof ••• Flame-proof, Intrinsic safe structures are available.
- Cable length ••• Cable length between sensors and alarm controllers or interconnection should be determined.

Followings are for reference:

Type of sensors		Cable	Maximum length
Electrodynamic velocity sensor		Shielded cable	500 m
Piezoelectric sensor	No pre-amplifier	Low noise cable	30 m
	Pre-amplifier built-in	Coaxial cable	200 m

*Depends on the condition. Please contact us for the further information.



2 Function

Please check the following items to select the systems. Please contact us before order.

■Monitoring mode

One of displacement, velocity or acceleration is monitored generally

■Monitoring level

Sensors and full scale value are determined by the level to be monitored.

■Alarm relay contacts

Alarms are outputted by the relay contacts. 1 or 2 alarm outputs (depends on the model) are available.

■Output level

DC 4 to 20 mA output is available for full scale. Models whose output can be changed to DC1 to 5 V are also available.

■Sensor cable break alarm

Standard equipment for VM-9301 connected with electrodynamic pickup

■Power supply break alarm

Alarm is outputted on the loss of the power supply performing no operation of the monitor.

System selection table

Object	Frequency(Hz)	Recommended model	Sensor type	Measurement mode
Abnormal detection	10 to 1000	VM-90DV	Electrodynamic velocity Medium frequency type	Velocity/ Displacement
		VM-90A		
		VM-9301		
	5 to 300	VM-90DVL	Electrodynamic Velocity Low frequency type	Displacement
		VM-9301		
Initial failure detection	From 1000	VM-90DA	Piezoelectric sensor	H function/Acceleration
		VM-90A		Velocity
		VM-9301A		H function/Acceleration

MEMO

Related products & Information

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 as ecologically friendly intelligent systems. IMV has the largest share in vibration test systems in the world market.

6 degree of freedom vibration test systems

Vibration test systems (A-series)

■ Test laboratory

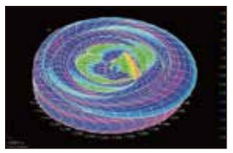
Since Japan's first establishment of vibration/shock test laboratory in Tokyo in 1998, we have been developing test laboratory businesses as Osaka test laboratory in 2005, Nagoya test laboratory in 2007 and the first overseas test laboratory in Thailand in 2012. Corresponding to development of the hybrid car, we opened 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.

Advanced Technology Centre

IMV TECHNO VIETNAM COMPANY LIMITED

■ Solution service

Experienced IMV engineers will support 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

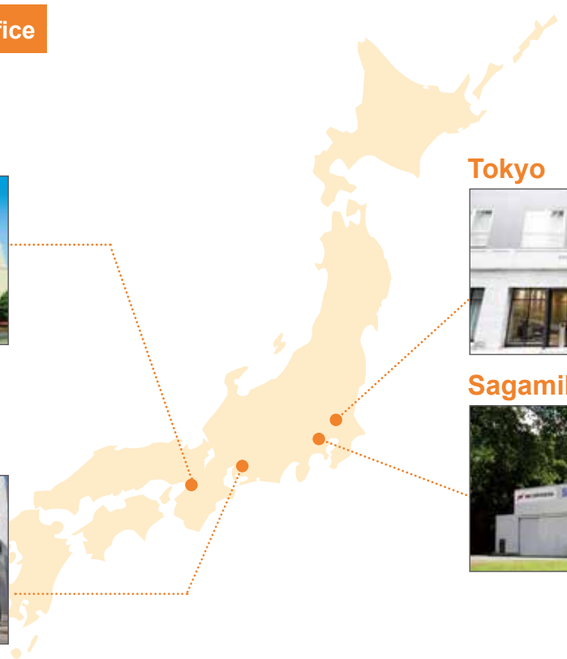
■ Environmental reliability evaluation system

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



Osaka

Please contact the head office for product details.
Tel +81 6 6471 3155

Nagoya

Tokyo

Sagamihara

End of sales products and alternative systems

End of sales				Alternative systems	
	Model	Product name	Maintenance period	Model	Product name
1	VM-90MFD	Vibration Switch	Till Sep.30th, 2026	VM-90MED	Vibration Switch
2	VM-90MFV	Vibration Switch	Till Sep.30th, 2026	VM-90MEV	Vibration Switch
3	VM-90MFA	Vibration Switch	Till Sep.30th, 2026	VM-90MEA	Vibration Switch
4	VM-91U	Non-contact Vibration/Position Monitoring Equipment	Till Sep.30th, 2026	–	Please contact us about the alternative systems.
5	VM-9120 series	Non-contact Vibration/Position Monitoring Equipment	End	–	Please contact us about the alternative systems.
6	VM-9123 series	Non-contact Vibration/Position Monitoring Equipment	End	–	Please contact us about the alternative systems.
7	VM-9201	Contact Sensor Type Vibration Monitoring System	Till Sep.30th, 2022	VM-9301	Contact Sensor Type Vibration Monitoring System
8	VP-3354 C/D	Electrodynamic Velocity sensor-Medium Frequency/2directional	End	VP-3354 A	Electrodynamic Velocity sensor-Medium Frequency/2directional
9	VP-3364 C/D	Electrodynamic Velocity sensor-Medium Frequency/3directional	End	VP-3364 A	Electrodynamic Velocity sensor-Medium Frequency/3directional
10	VP-4200	Piezoelectric Accelerometer	End	VP-420A	Piezoelectric Accelerometer
11	VP-4200-6	Piezoelectric Accelerometer	End	VP-4201H	Piezoelectric Accelerometer
12	VP-4200H	Piezoelectric Accelerometer	End	VP-4201H	Piezoelectric Accelerometer
13	VPA11IW	Piezoelectric Accelerometer	End	VP-A12IW	Piezoelectric Accelerometer
14	VP-A51IW	Piezoelectric Accelerometer	End	VP-A52IW	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