

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.

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*The specifications and design are subject to change without notice.

IMV CORPORATION

Contact Sensor Type Vibration Monitoring System Signal Converter

DC4-20 mA Output Accelerometer

Vibration Switch (VM-90M series)

Vibration Switch (VM-90A) Vibration Signal Converter

∧-Vibro

≫ P05≫ P07

≫ P09

≫ P10 ≫ P11

≫ P12





Future ntegrity

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.

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.

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

1

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	DC4-20 mA Output Accelerometer	Vibration Switch	Vibration Signal Converter	Vibration Switch
Model	VM-9301 series	VM-5011A	VP-420/VP-421/ VP-422	VM-90A	VM-90D series	VM-90M series
Indicator	\bigcirc	—	—	_	\bigcirc	\bigcirc
Alarm relay contact	1-2			2	1	2
Level output (DC4-20 mA)	0	\bigcirc	0	0	\bigcirc	0
Function changeover*		_		0	\bigcirc	
Simultaneous monitoring for plural functions	0	\bigcirc				

*Changeover of displacement/velocity/acceleration

Application examples



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.

Looturoo	ł
reatures	
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- Mixed implementation with the conventional system "VM-9201" is possible
- Wide variety of compatible sensors
- Available for multi-channel system

Compatible with conventional systems



1.6.1

-

Type 1 channel

-

ALC: IT 1222244

Type 12 channel

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.

Eastern	Concert average to the c	0	0i	E lama a a a a	E a la setation	For low ortefing /Flower and of
Feature	General-purpose type	2-axis	3-axis	Fiame-proor	For low rotation	For low rotation/Flame-proof
Туре	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°C	-20 to +80°C	-20 to +80°C	-20 to +70°C	-20 to +70°C	-20 to +70°C
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	100			Type AC	
Notes	-	-	_	_	Horizontal only	H (horizontal only), V (vertical only)



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



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

Specifications

Туре		VM-9301 series	VM-9301A series	Туре	Type VM-9301 series		VM-9301A series								
Sens	or	Electrodynamic velocity sensor	Electrodynamic velocity sensor Piezoelectric sensor		DC	Select from DC4-20 mA (insulation output), Loading 500 Ω or less or									
Amplifier unit type 1 line: VA-9301(1-I) Select velocity or displacement Type 2 line: VA-9301(2-I)		Type 1 line: VA-9301(1-I) Select velocity or displacement Type 2 line: VA-9301(2-I)	Type 1 line: VA-9301A (1-I) Select acceleration, velocity or displacement Type 2 line: VA-9301A (2-I)	level output	DC output 2	Select fr DC1-5 \ DC1-5 \	rom DC4 (insulation) v (insulation)	-20 mA(i on output),	nsulation c	utput), Lo 100 kΩ	or more or more	0 Ω or le	ss or		
		Simaltaneous measurement of velocity and displacement	Simaltaneous measurement of any two of acceleration, velocity or displacement 5 to 10 kHz(-30 to +6%) Eithen and bacterial to (6%)	Waveform	Pickup waveform output	AC±10 m Loading (Depend	nV/(mm / g 100 kΩ ding on s	s)or AC±1 or more sensor sp	17.5 mV/(r becificatio	nm/s), ns)	AC±5 n (Depen	nV/(m/s²) ding on s	, Loading ensor sp	100 kΩ ecificatio	or more ns)
Frequ	lency	Filter selectable (pass band)	High-pass filter: 5, 10, 20, 50, 100 Hz		Waveform	AC±5 V(at the full-scale), Loading 100 k Ω or more									
range	•	High-pass filter: 5, 10, 15, 20, 50, 100 Hz	Low-pass filter: 100, 200, 500, 1k, 5k, 10 kHz	Panel r	neter	Red LEI	D three-c	ligit indic	ation, [9.	9.9] is dis	splayed a	t over 12	0% of ful	-scale	
		Low-pass filter: 20, 50, 100, 200, 500 Hz	Low-pass filter: -500 Hz in case of displacement of velocity	Operating ten	perature range	0 to 50°0	C, 20 to 9	95% RH,	wet bulb	tempera	iture is 38	5°C (non-ce	ondensing)		
			-1 kHz in case of velocity)	Power	supply	Availabl	le range	AC 85 to	264 V, 4	l7 to 66 ⊦	lz				
Measurem	ent Displaceme	mt 50, 100, 150, 200, 300, 500, 999 (1,000) μmP-P	100, 150, 200, 300, 500, 999 (1,000) µmP-P	Power		20 VA or	less (1 ch),	30 VA or I	ess (3 ch), 4	15 VA or les	ss (6 ch), 60	VA or less	6 (9 ch), 75 V	/A or less (12 ch)
range	Veloci	ty 10, 15, 20, 30, 50 mm/s	10, 15, 20, 30, 50 mm/s	consur	consumption At AC100V (Depe		AC100V (Depends on the number of amplifier or power supply)								
	Accelerati	Jn 10, 15, 20, 30, 50, 100, 150, 200, 300, 500 m/s			g color	lor Munsell 5Y7/1, half matted									
Equipme	Indication	tion Orange LED located on the upper part of amplifier front panel [FAT] Secondary power is lit at ubnormal condition.		Mass	ass 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)					kg (12 ch)					
failure	Alarm conta	d 1a contact (open at normal condition) operate under fuse me	ting, power switch shut off and primary / secondary power failure	Outward D Panal cutout											
	Alarm res	Select from automatic or manual recovery		dimen	sion	0/			d	imensior	1	I			
Picku cable	p Indicatio	Green LED located on the upper part of am Lights-out when wire is broken (lights-on at (When pickup connected with charge amplit)	plifier front panel (PU) normal condition) ier is used, this function is not valid.)		D			E				F -	+	1	
break	Alarm conta	d Standard: 1a contact *available 1b or 1c (open at normal condition	on, closed when wire is broken) operate when pickup cable is broken.		D			_ ↓			+		+	H G	
alarm	Alarm res	et Select from automatic or manual reset				¥ [٩	i	\$	_	
	Alarm ste	Type 1 line: upper limit 2 steps Alarm (ALM Type 2 line: upper limit 1 step Alarm1 (ALM)	I) / Trip (TRP) /1,1line), Alarm2(ALM2, 2line)			A	\rightarrow							4-M5 or	φ6
	Delay tim	er Select from 0 to 15 sec. by the slide switch	inside of the amplifier unit (0 sec. if not specified.)												
	Setting	g 5.0 to 99.9% (can be set at 0.1% step) (When alarm function is not used 99.9% is set. Indi	cation lamp and contact is on at over fullscale value)	Chann	Dir	mension	А	в	с	D	E	F	G	н	I
Alarr	m Indication Type 1 line: Orange LED [ALM], red LED [TRP]		Type 1	channel		90	170	300	88	132	90	148	162	50	
	lamp Type 2 line: Orange LED [ALM1], red LED [ALM2]		Туре 3	channel		210	149	300	160	132	180	143	100	195	
	Alarm	Select from "ALM/ALM1 circuit: 2a contact	TRP/ALM2 circuit 2a contact" or	Туре 6	channel		300	149	300	250	132	270	143	100	285
	Contactores	ALIVI/ALIVI CITCUIL ID TA CONTACT TRP/ALI		Type 9	channel		390	149	300	340	132	360	143	100	375
	Alarm rec	Select from automatic (Hustorosis 2%) or man		i ype i	z channe	1	400	149	300	430	132	430	143	100	405
	Addition	a oeleor nom automatic (Hystelesis 5%) of man	uarreset												Unit: mm

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

The difference between C and Dis the shape of cable connection





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.

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



VP-8021A

Suitable sensors

Model	VP-8021A
Sensor type	Base insulated voltage drive type
Acceleration sensitivity	3.9 mV/(m/s ²) ±5%
Vibration	20 Hz to 3 kHz ±1 dB
frequency	10 Hz to 8 kHz ±3 dB
response	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	Maximu	m 200 Ω			
Operating temperature range	-55 to 140°C	-30 to 90°C			
Protection grade	IP65	IP68			
Mass	Approx. 125 g (Ca	able not included)			
Material	SUS	\$303			
Mounting method	M6Scre	w fixing			
Cable material	SUS Braided cable	PUR			
Standard cable length	5 m				
Maximum cable length	200 m				

Connection Example



Specifications

Item		Specification				
Input range		0 to 500 m/s ²				
Measuring range	E acceleration	acceleration 10 Hz to 1 kHz Band pass filter: 500 Hz to 10 kHz				
or inequency	Velocity	10 Hz to 1 kHz (ISO 2954: 2012 Filter characteristics compliant)				
Moosuring range*	E acceleration	□ 10 m/s ² E rms □ 25 m/s ² E rms □ 100 m/s ² E rms				
measuring range	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 k Ω or lower)				
Linearth	DC出力	Within ±3%F.S				
Linearity	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						

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.



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





VP-8021A



VP-100





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



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

Application example



Basic connection example (common for all types)



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

Specifications

Item	Velocity(current output)	/P-420 Velocity(curro Acceleration	ent output)+ n waveform(voltage outp	ut)VP-421 Accelera	tion (current output) VP-422			
Frequency range	10 Hz to 1 kHz, ±5% (ISC	010816) 10 Hz to 1	kHz, ±5%(ISO1081	6) 10 Hz 1	to 5 kHz, ±3 dB			
Measurement range	10,20,25,50,100 mm	mm/s rms 10,20,25,50,100 mm/s rms 9.8,19.6,49,98,			i, 49,98, 980 m/s ² rms			
Output sensitivity	4 – 20 mA/0 – full s	scale 4 – 20 mA/ Acceleration w	0 – full scale avefom: 5 mV / (m/s ²), 10	.2 mV/ (m/s ²) 4 - 20	mA/0 – full scale			
Voltage supply	DC15 to 30 V, 30mA or more							
Warm-up time		Approx. 2 seconds						
Output impedance		D	C24 V, maximum 60	Ω 00				
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. 150 g (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)							
Plea	ase inform us requested full	scale value and cable len	gth. Acceleration output +	acceleration waveform ou	tput 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	a			3				



Application example



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

Specifications

Item		Specification	Item
Frequency	Acceleration	8 Hz to 8 kHz, -3 dB (10 Hz to 5 kHz, ±1dB)	Sensor (VP-A52IW)
range	Velocity	10 Hz to 1 kHz, ±1.5 dB	Sensor cable
	Displacement	10 Hz to 300 Hz, ±1.5 dB	Standard accessories
Measurement	Acceleration	10,100 m/s ²	
range	Velocity	10, 100 mm/s rms	
	Displacement	100, 1,000 µmp-p	Option
Alarm output	Individual lev Individual 10 Delay time s Automatic re	vel setting (upper 2 steps): 10 to 100% contact: maximum capacity DC30 V, 1A etting: 1 to 10 seconds set	Item Mechanical filter (MC
Level output	DC4 – 20 m	A (maximum load resistance 300 Ω)	Outward dimension
Monitor output	AC3 VP-P fu DC2 V fu	II scale II scale	
Power supply	AC100 V±10) V, 47 to 63 Hz	
Power consumption	5VA or smaller		
Operating temperature / humidity range	0 to +50°C, 3	5 to 95% RH (non-condensing)	
Mass / Size	74 (W) × 72	(D) × 90 (H) mm/approx. 250 g	





Centrifugal Cooling tower separator

Standard composition

Item	Notes						
P-A52IW)	Piesoelectric sensor (see page 22)						
le	o m long cable with a sensor connector and waterproof cap						
ccessories	screw for sensor 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 200 m) Please refer to page 29 about the cable length							
Item	Notes						
l filter (MCF-6)	Prevention of incorrect operation on displacement / velocity measurement. Elimination of high frequency component.						
	4-q3 5 (mounting hole)						

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



Sensor type	E	electrodynamic velocity typ	Piezoelectric	accelerometer	
Sensitivity	10 mV/ (mm/s)	17.5 mV/ (mm/s)		5 mV/ (m/s ²)	50mV/G
latural frequency	14 Hz	4.5	Hz	35,000 Hz	24,000 Hz
perating temperature range	-20 to+80°C	-20 to +	-70°C	-30 to+110°C	-20 to+80°C
Structure	Dr	op-proof (Equivalent to IP	32)	Isolated/Water-proof	Safe and explosion proof (Ex ia II C T4 Ga)
Outward appearance		Horizontal only	Vertical only	Ļ	
Notes	Suitable for monitoring of medium frequency displacement or velocity	Suitable for monitoring of low fre	quency displacement or velocity	Suitable for monitoring of acceleration	Insulated

 Type
 VP-3144C/D
 VP-3213AC/AD (Horizontal only)
 VP-3223AC/AD (Vertical only)
 VP-A52 IW
 HS-100I

*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	Main body	Red 7 segment LED (4 digit indication)	
function	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°C 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 (A	Applicable to p	re-amplifier build-in type sensor)	(VP-A52IW, HS-100
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	f 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 fun	ction)
VM-90DV (A)	pplicable to m	edium frequency sensor)	(VP-3144C/E
Measurement mode	Item	Specifications	
			5
Velocity*5	Measurement range	5, 10, 20, 50, 100 (mm/s rms)	5
Velocity*5	Measurement range Frequency range	5, 10, 20, 50, 100 (mm/s rms) 10 to 1 kHz ±1 dB	5
Velocity*5 Displacement*5	Measurement range Frequency range Measurement range	5, 10, 20, 50, 100 (mm/s ms) 10 to 1 kHz ±1 dB 50, 100, 200, 500, 1,000 (μmp-p)	5
Velocity*5 Displacement*5	Measurement range Frequency range Measurement range Frequency range	5, 10, 20, 50, 100 (mm/s rms) 10 to 1 kHz ±1 dB 50, 100, 200, 500, 1,000 (µmp-p) 10 to 500 Hz ± 1 dB	5
Velocity*5 Displacement*5 VM-90DVL (A	Measurement range Frequency range Measurement range Frequency range pplicable to lo	5, 10, 20, 50, 100 (mm/s rms) 10 to 1 kHz ±1 dB 50, 100, 200, 500, 1,000 (μmp-p) 10 to 500 Hz ± 1 dB w frequency sensor)	s (VP-3123AC/AD, VP-3223AC/AD
Velocity*5 Displacement*5 VM-90DVL (A Measurement mode	Measurement range Frequency range Measurement range Frequency range pplicable to lo Item	5, 10, 20, 50, 100 (mm/s rms) 10 to 1 kHz ±1 dB 50, 100, 200, 500, 1,000 (μmp-p) 10 to 500 Hz ± 1 dB w frequency sensor) Specification	s (VP-3123AC/AD, VP-3223AC/AD S
Velocity*5 Displacement*5 VM-90DVL (A Measurement mode Velocity*5	Measurement range Frequency range Measurement range Frequency range pplicable to lo Item Measurement range	5, 10, 20, 50, 100 (mm/s rms) 10 to 1 kHz ±1 dB 50, 100, 200, 500, 1,000 (μmp-p) 10 to 500 Hz ± 1 dB w frequency sensor) Specification 5, 10, 20, 50, 100 (mm/s rms)	s (VP-3123AC/AD, VP-3223AC/AD S
Velocity*5 Displacement*5 VM-90DVL (A Measurement mode Velocity*5	Measurement range Frequency range Measurement range Frequency range pplicable to lo Item Measurement range Frequency range	5, 10, 20, 50, 100 (mm/s rms) 10 to 1 kHz ±1 dB 50, 100, 200, 500, 1,000 (μmp-p) 10 to 500 Hz ± 1 dB w frequency sensor) Specification 5, 10, 20, 50, 100 (mm/s rms) 5 to 500 Hz ± 1 dB	s (VP-3123AC/AD, VP-3223AC/AD \$
Velocity*5 Displacement*5 VM-90DVL (A Measurement mode Velocity*5 Displacement*5	Measurement range Frequency range Measurement range Frequency range pplicable to lo Item Measurement range Frequency range Measurement range	5, 10, 20, 50, 100 (mm/s rms) 10 to 1 kHz ±1 dB 50, 100, 200, 500, 1,000 (µmp-p) 10 to 500 Hz ± 1 dB w frequency sensor) Specification 5, 10, 20, 50, 100 (mm/s rms) 5 to 500 Hz ± 1 dB 50, 100, 200, 500, 1,000 (µmp-p)	s (VP-3123AC/AD, VP-3223AC/AD \$
Velocity*5 Displacement*5 VM-90DVL (A Measurement mode Velocity*5 Displacement*5	Measurement range Frequency range Measurement range Frequency range pplicable to lo Item Measurement range Frequency range Measurement range	5, 10, 20, 50, 100 (mm/s rms) 10 to 1 kHz ±1 dB 50, 100, 200, 500, 1,000 (μmp-p) 10 to 500 Hz ± 1 dB w frequency sensor) Specification 5, 10, 20, 50, 100 (mm/s rms) 5 to 500 Hz ± 1 dB 50, 100, 200, 500, 1,000 (μmp-p) 5 to 500 Hz ± 1 dB	s (VP-3123AC/AD, VP-3223/ S

*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

Suitable sensors



Specifications

_	Monitor for displacement	Monitor for velocity	Monitor for acceleration
Type	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/s², 0 to 2m/s², 0 to 5 mm/s², 0 to 10 m/s², 0 to 20m/s², 0 to 50m/s², 0 to 100 m/s²
Alarm step	2 steps		
DC output (for recorder)	4 to 20 mA (at the load 0 to 300 Ω) 1 to 5 V (100 k Ω or more, 250 Ω connection to outside		
Alarm action	Activated over alarm setting value (time constant: approx. 3 seconds)		
Ararm 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°C 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		





VM-90MEV

y)	VP-A52IW	VP-3133 HEX/VEX	VP-3134 AEX	
	Piezoelectric accelerometer	Electrodynami	c velocity type	
	5 mV/(m/s ²)	17.5 mV/ (mm/s)	10mV/ (mm/s)	
	35,000 Hz	4.5 Hz	14 Hz	
	-30 to +110 °C	-20 to	+70 °C	
	Isolated/Water-proof	Flame-pr	oof (EX d II BT4Gb)	
nly	L			
	Suitable for monitoring of acceleration	Suitable for monitoring of low frequency displacement or velocity	Suitable for monitoring of medium frequency displacement or velocity	

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

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.

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.

Data storage suitable for diagnosis

Conception of the second se

/I-Vibro

Suitable sensors

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

System composition



Option Database software DS-8018

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



Waveform



FFT



Easy data access

directly. *VM-8018 only

Uses Windows®10 IoT Core as the OS*

Folders and files in Lambda Vibro can be

in CSV format, so you can check the data

accessed from the same network. The file is



Specifications

ltem	VM-8018	VM-8018-LIT	Itom	V/M_8018	VM-8018-LIT
Analog channel	8 ch (Maximum ± 15 V)		Measurement	Acceleration: m/s ² , gal, G Velocity (calculated value): mm/s Displacement (calculated value): um	Acceleration: m/s ² , gal, G Velocity (calculated value): mm/s Displacement (calculated value): um
Sampling resolution	16 Bit (Serial type)		object		
Sampling frequency	400 Hz – 51.2 kHz (Suppo	rts simultaneous sampling)		Voltage: V, mV, µV	Voltage: V, mV
Connected sensor	VP-100M, VP-8	3021C, VP-8013	Sampling rate	te 51200sps, 25600sps, 12800sps, 10240sps, 6400sps, 51200sps, 3200sps, 2560sps, 2048sps, 1600sps, 400sps, 400s	
ICP output current	3.5 m	A/24 V			
Trigger channel	1 ch (input) M	/laximum 24 V		12003p3, 10243p3, 0003p	3, 0403p3, 3123p3, 4003p3
Channel terminal shape	HD-BNC (MicroBNC)	Voltage range	±2.56 V, ±5.12 V, ±10.24 V, ±20.48 V (Measurement range is ±15V.)	
	USB2.0 typeB (Host mode)		Measurement time	0.1 s – 40.9 s	0.1 s – 20.0 s
Function port	Wired LAN (file sharing)		Trigger	Measurement start by extern	al trigger and reserved trigger
Wireless connectivity	WLAN 802.11 b/g/n (file sharing)			1	
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°C				
Storage capacity	32GB (standard), 64GB (option), 128GB (option)	32GB			

pration Monitoing Systems





VP-8021A



VP-100

Measurement specifications

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 senso Piezoelectric sensor



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.



The table below shows the fixing angle of sensor

Fixing methods



whose natural frequency is 14 Hz or 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	Li	near pendulum type
	Specifications	
Medium	Sensitivity	10 mV/(mm/s)
frequency	Detection axis	Horizontal or vertical
	Natural frequency	14 Hz
	Frequency range	10 to 1,000 Hz*1
	Maximum allowable acceleration	100 m/s ²
	Maximum measurable displacement	1,000 µmp-p
COLUMN.	Operating temperature range	-20 to +80°C
	Structure	Drop-proof (Equivalent to IP32)
	Cable connection	Pipe thread(type C), direct connection of clamp(type D)
	Suitable cable	2 core shielded cable
And an and a second second	Weight	200 g
Type C	Case material	Aluminum
Output terminal (M3) Pipe	thread G1/2 (PF1/2)	4-M5 or φ6
4-M3 Supporter mount hole	71 Deter 10	tion
		Type C

VP-3144W Linear pendulum type Specifications 10 mV/(mm/s) nsitivity Horizontal or vertical tection axis atural frequency 14 Hz Frequency range 10 to 1.000 Hz timum allowable acceleration 100 m/s² ximum measurable displacement 1,000 µmp-p Operating temperature range -20 to +80°C ructure Natrproof (Equivalent to IP66 able connection Pipe thread 2 core shielded cable uitable cable Weight 600 g Aluminum

Case material

Outward dimensions







VP-3374C/D

High

	Specifications	
h	Sensitivity	10 mV/(mm/s)
rature	Detection axis	Horizontal or vertical
	Natural frequency	14 Hz
	Frequency range	10 to 1,000 Hz ^{*1}
	Maximum allowable acceleration	100 m/s ²
	Maximum measurable displacement	1,000 µmp-p
	Operating temperature range	-30 to +105°C
	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
Type D	Case material	Aluminum

Linear pendulum type

Outward dimensions 2-M5 or φ6 10+0 5 Cable clamp 4-M3 Suppor fixing hol Detection direction 30 50 Type D

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

Electrodynamic velocity sensor













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

Type D

Electrodynamic velocity sensor





Comment

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



VP-3133HEX (Horizontal only) VP-3133VEX (Vertical only) Linear pendulum type			
		Specifications	1 51
Low	-	Sensitivity	17.5 mV/(mm/s)
frequency	Flame-proof	Detection axis	VP-3133H(Horizontal only), VP-3133V(Vertical only)
		Natural frequency	4.5 Hz
		Frequency range	5 to 500 Hz*1
1	and the second se	Maximum allowable acceleration	29 m/s ²
Constanting of the local division of the loc		Maximum measurable displacement	1,000 µmp-p
		Operating temperature range	-20 to +70°C
1 mar		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
	Type V		



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



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

Features

VP-431

100

VP-A52IW, VP-4200I VP-13, VP-32, VP-4201

[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

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

<u>10dB</u>

10k Frequency

(Hz) →

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

acceleration sensitivity to be suitable to

monitor earthquakes or small vibration

of the testing models of dam, power

station or small equipments, for exam-

is bent being applied an acceleration.

This is light weight and has high

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

Piezoelectric sensor



VP-4200I

Charge/ share type Isolated General type
*
VP-62001 IMV





VP-AIZIW

Isolated

IMV

Specifications	
Resonance frequency	> 50,000 Hz
Frequency range	3 to 10,000 Hz ±3 dB
Voltage sensitivity	1 mV/(m/s ²) ±20%
Maximum measurable acceleration	3,500 m/s ²
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)



Fixing methods

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%.



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



VP-4201H



and a 0110 H

Specifications

Resonance frequency	> 23,000 Hz
Frequency range	fc*1 to 5,000 Hz ±1 dB
Charge sensitivity	5.0 pC/(m/s ²) ±20%
Capacitance	1,000 pF
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)



VP-A52IW



Specifications

Resonance frequency	> 35,000 Hz
Frequency range	3 to 10,000 Hz ±3 dB
Voltage sensitivity	5 mV/(m/s ²) ±10%
Maximum measurable acceleration	700 m/s ²
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	Output connector (TNC type)

HS-100 in pre-amp Shear type

Intrinsic safet



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/s ²
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 dimension



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

Piezoelectric sensor



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		
	Outward dimensions	Output tetminals BNC connector (R) BNC connector (R) DN 0 PN 0 PN 0 PN 0 PN 0 PN 0 PN 0 PN 0 P

Mounting adaptor for piezoelectric accelerometer



Strong magnet (for spherical surface) MH-203R

-

BNC-PA-JJ

0



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)	or 10-32 screw plug (MTS)	HB-2C/□/MB
VP-4201H	10-32 screw plug (heat resistant)	HR-2C (260°C)	or 10-32screw plug (MTS)	= HR-2C/□/MB = HR-2C/□/MM
VP-42IW	TNC screw plug	HB-3C(200'C)	BNC plug	— нв-зс/п/тв
VP-A52IW VP-A12IW	TNC screw plug	RG-58AU(60'C)	BNC plug	■ RG-58AU/□/TB
HS-100I	M12 4 pole	LiF9YHC11YH	No connector	MS-AC266/□ *□ represents cable length

Interconnection conversion connector



Related Products

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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 (φ 82)
- 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

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

Item	Specification								
Input signal	'iezoelectric 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	Acceleration 1, 10, 100, 1000, 10000 m/s ² 5 range								
(for an accelerometer of charge sensitivity 1.0–9.99pc / m/s ²)	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								
	Jacement 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	.ower 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	ms: 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 Setting: 0 to 110% for every range Contact capacity: DC30 V 0.5 A, AC120 V 0.5 A								
Output	Waveform: voltage 0 to $\pm 5 V$ (load 10 k Ω or higher) calibration output: 80 Hz Sine output Level output: voltage 0 to $\pm 5 V$ (load 10 k Ω 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								

VM-7144





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.
- 3. Damage caused by use with another product.
- 4. Damage caused by disassembling, repair or remodel by others who is not our personnel.
- 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

2. Damage caused by natural disaster such as fire, earthquake, flood and lightning or abnormal voltage.

(2) Limit of coverage is the extent described in (1). Any secondary damages (failure of other equipments, opportunity loss, lost profit etc.) caused by

Technical Guide

Section 1 Vibration Terminology

Frequency

Unit: Hz

Velocity

Unit: mm/s, cm/s

which are rather stable.

PEAK to RMS ratio

Envelope

by relative comparison. C+F =PEAK / rms

repetitive motion in 1 second.

PEAK(Peak amplitude)

Peak value in a certain time duration.

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

It is used to measure shocks or waves

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 means the number of times that vibrating object makes a

Velocity means the time rate of change of displacement (D).



Displacement

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

Acceleration

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

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.



EQP (Equivalent Peak value)

It is a sine peak assumed by the rms value. For Sine wave, the relationship $rms \times \sqrt{2}$ =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.



5,000-20,000 Hz

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

The following terms are of analysis methods defined in IMV.

C • **F** (Peak factor • Crest factor)

It is used to determine deterioration of bearings

• Envelope acceleration (E1~E4)

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.

peak value

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

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.

ISO 10816-3:2009 Vibration Standard Evaluation Objective machinery is classified into two major groups.



Section 2 Judge criteria

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



Medium machinery

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



Technical Guide



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

Technical Guide

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 se	nsors	Cable	Maximum length
Electrodynamic vel	ocity sensor	Shielded cable	500 m
Piezoelectric	No pre-amplifier	Low noise cable	30 m
sensor Pre-amplifier built-in		Coaxial cable	200 m



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		VM-90DV		Velocity/ Displacement		
	10 to 1000	VM-90A	Medium frequency type			
		VM-9301				
	E 1 000	VM-90DVL	Electrodynamic Velocity	Displacement		
	5 to 300	VM-9301	Low frequency type			
Initial		VM-90DA		H function/Acceleration		
failure detection	From 1000	VM-90A	Piezoelectric	Velocity		
		VM-9301A	3011301	H function/Acceleration		

MEMO



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



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.



MIG-8600B



MIG-87

IMV TECHNO VIETNAM COMPANY LIMITED Advanced Technology Centre

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

Environmental reliability evaluation system

Solution service

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





Sound isolation design and work for manufacturing facilities

Head office / Sales Office



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

Nagoya





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