Vibration Analyzer VA-14

Specifications

Standard compliance	CE Marking	・EMC Directive 2014/30/EU EN 61326-1:2021 ・Low Voltage Directive 2014/35/EU EN 61010-1:2010/A1:2019 ・RoHS2 Directive 2011/65/EU EN IEC 63000:2018
	WEEE	Directive 2012/19/EU
	China RoHS	
	KC Mark	The KC Mark compliance for this product can be verified on the following website of the National Radio Research Agency：http://www.rra.go.kr/selform/RIO-VA14 The manufacturing date of this product is indicated on the main unit.
Input function	Number of measurement channels	1
	Connector and type, etc.	BNC connector CCLD power supply 20 V, 2 mA
Sensitivity setting	PV-57I (supplied) sensitivity typical value	510×0.01 mV/(m/s²)
	Others Sensitivity setting range	0.100 mV/(m/s²) to 99.9 mV/(m/s²)
	Calibration	Calibration using VE-10 is possible in addition to inputting the sensitivity value supplied with the accelerometer. However, consideration must be given to prevent the weight and shaking of the cable from affecting the measurement. (VE-10 can calibrate up to 70 g, and the weight of PV-57I alone is about 45 g.) Calibration frequency：159.2 Hz Calibration level：10 m/s²
Piezoelectric accelerometer PV-57I (accessory)	Accelerometer type	Shear-type piezoelectric accelerometer (CCLD type)
	Sensitivity	Listed on supplied calibration chart of PV-57I
	Frequency range	1 Hz to 5 kHz (±10%)
	Dimensions, weight	17 mm (width across hexagonal flat) × 49 mm (height)　Approx. 45 g Magnet attachment　Approx. 15 g
Input connectors	Accelerometer connector	× 1 channel (BNC) Connector for piezoelectric accelerometer (standard supplied accelerometer：PV-57I) Sensor drive (CCLD：20 V, 2 mA) supported When using PV-57I with built-in charge amplifier (CCLD type) Frequency range：1 Hz to 5 kHz Maximum continuous acceleration measurement limit：200 m/s² peak
	External trigger input connector (TRIG IN)	× 1 (ultra mini jack, 2.5 mm dia.) External trigger control using falling edge of TTL level signal
Input range	When the sensitivity is (0.100 to 0.999) mV/(m/s²)	Acceleration (ACC)：(10, 31.6, 100, 316, 1000, 3160, 10000) m/s²(rms) Velocity (VEL)：(31.6, 100, 316, 1000, 3160, 10000, 31600) mm/s(rms) Displacement (DISP)：(0.89, 2.83, 8.94, 28.3, 89.4, 283, 894) mm(EQ P–P)
	When using PV-57I or the sensitivity is (1.00 to 9.99) mV/(m/s²)	Acceleration (ACC)：(1, 3.16, 10, 31.6, 100, 316, 1000) m/s²(rms) Velocity (VEL)：(3.16, 10, 31.6, 100, 316, 1000, 3160) mm/s(rms) Displacement (DISP)：(0.089, 0.283, 0.89, 2.83, 8.94, 28.3, 89.4) mm(EQ P–P)
	When the sensitivity is (10.0 to 99.9) mV/(m/s²)	Acceleration (ACC)：(0.1, 0.316, 1, 3.16, 10, 31.6, 100) m/s²(rms) Velocity (VEL)：(0.316, 1, 3.16, 10, 31.6, 100, 316) mm/s(rms) Displacement (DISP)：(0.0089, 0.0283, 0.089, 0.283, 0.89, 2.83, 8.94) mm(EQ P–P)
Measurement range	(using PV-57I, high-pass filter 3 Hz, low-pass filter 5 kHz)	
	Acceleration	0.02 m/s² to 141.4 m/s² (rms) (limited by maximum continuous measurement acceleration of PV-57I)
	Instantaneous maximum acceleration	700 m/s²
	Velocity	0.2 mm/s to 141.4 mm/s (rms) (at 159.15 Hz input)
	Displacement	0.02 mm to 40.0 mm (EQ P–P) (at 15.915 Hz input)
Linear operating range	With respect to the full-scale range, when an electrical signal is input (sensitivity setting: 5.10 mV/(m/s²))	
	Acceleration (ACC)	0.02 m/s² to 1000 m/s² (rms) ±2% (at 80 Hz input)
	Velocity (VEL)	0.1 mm/s to 1000 mm/s (rms) ±3% (at 159.15 Hz input)
	Displacement (DISP)	0.0283 mm to 283 mm (EQ P–P) ±5% (at 15.195 Hz input)

Measurement frequency range	Acceleration	1 Hz to 20 kHz
	Velocity	3 Hz to 3 kHz
	Displacement	3 Hz to 500 Hz
	Acceleration envelope curve	1 kHz to 20 kHz
Unit of measurement	Vertical axis can be changed between linear and dB. The dB reference criteria are as follows:	
	Acceleration	1 m/s²
	Velocity	1 mm/s
	Displacement	1 mm
	Envelope	1
	It is also possible to switch to acceleration G (≈ 9.81 m/s2), velocity inch/s (= 25.4 mm/s), and displacement mils(= 0.0254 mm) to correspond to Imperial units.	
Dynamic range in FFT mode	Acceleration (with 80 Hz electrical signal input)	94 dB
	Velocity (with 159.15 Hz electrical signal input)	80 dB
	Displacement (with 80 Hz electrical signal input)	80 dB
	Input voltage range for general-purpose input function	0.0287 mV to 5100 mV (rms) (with VX-14S option)
	・ Maximum measured sound pressure with UC-59 + NH-22A using the microphone-preamplifier connection function： 42 dB to 138 dB	
Filter characteristics	Pre-filter Vibration severity (Velocity RMS values with a frequency range of 10 Hz to 1 kHz, in accordance with ISO 2954:2012. Corresponds to a velocity high-pass filter (HPF) at 10 Hz and a low-pass filter (LPF) at 1 kHz (－3 dB point).	
	High-pass filter (HPF)	1 Hz (acceleration only), 3 Hz, 10 Hz, 1 kHz (－10% point) Cutoff slope －18 dB/oct
	Low-pass filter (LPF)	1 kHz, 5 kHz, 20 kHz (－10% point) Cutoff slope －18 dB/oct
	HPF and LPF can also be set separately for acceleration, velocity, and displacement.	
Residual noise （HPF at 3 Hz, LPF at 20 kHz, lowest range setting)	Electrical characteristics of the main unit (VP-40+1000 pF dummy short)	Acceleration：0.01 m/s² (rms) or less
		Velocity：0.1 mm/s (rms) or less
		Displacement：0.01 mm (EQ P–P) or less
	PV-57I	Acceleration：0.01 m/s² (rms) or less
		Velocity：0.1 mm/s (rms) or less
		Displacement：0.03 mm (EQ P–P) or less
RMS value detection circuit	Digital calculation method	
Calculation items （Vibration meter (VM) mode, Time waveform (TIME) mode, FFT analysis mode)	Vibration meter (VM) mode	ACC (Acceleration)： m/s2　RMS, PEAK, crest factor VEL (Velocity)：mm/s　RMS, EQPEAK (and PEAK when VX-14S is installed) DISP (Displacement)：mm, μm　RMS, EQPEAK, EQ P–P (and PEAK when VX-14S is installed)
	Time waveform (TIME) mode	Time waveform Data type　：ACC, VEL, DISP, Acceleration envelope curve Number of analysis lines　：200, 400, 800, 1600, 3200 Frequency span　：100 Hz, 200 Hz, 500 Hz, 1 kHz, 2 kHz, 5 kHz, 10 kHz, 20 kHz
	FFT analysis mode	Spectrum Data type　：ACC, VEL, DISP, Acceleration envelope curve Number of analysis lines　：200, 400, 800, 1600, 3200 Frequency span　：100 Hz, 200 Hz, 500 Hz, 1 kHz, 2 kHz, 5 kHz, 10 kHz, 20 kHz Time window functions　：Rectangular, Hanning, Flat-top Calculation　：Instantaneous value, linear average, maximum value, exponential average （Linear average and maximum value should be able to be calculated and saved simultaneously.) Average number　：Maximum 2048 times <The overlap ratios are shown in the table below> ・Frequency (Hz), Overlap ratio（%） 100 Hz ＝ 0.875% 200 Hz ＝ 0.875% 500 Hz ＝ 0.75% 1000 Hz ＝ 0.5% 2000 Hz ＝ 0% 5000 Hz ＝ 0% 10000 Hz ＝ 0% 20000 Hz ＝ 0%
Sampling frequency	Sampling frequency 51.2 kHz	

Waveform recording function	Vibration meter (VM) mode	Up to 200 hours (when VX-14S is installed).
	FFT analysis mode	Can record up to 1 MB per file (up to 10 seconds at a sampling frequency of 51.2 kHz). Records vibration waveforms during FFT analysis mode calculation.
Trigger	Trigger source	External trigger, Level trigger
	Trigger level	Steps of 1/8 of full scale on one-sided amplitude
	Trigger slope	＋／－
	Pre-trigger	1/8 frame
	Trigger operation	Free　：Calculation is carried out constantly, regardless of the trigger condition. Repeat：Calculation is carried out every time the trigger condition is met. Single　：Calculation is carried out only once when the trigger condition is met.
External trigger connector input	TTL level Jack 2.5mm dia.	
Pause function	Pauses the display on the screen.	
Display	Device	3.5-inch TFT-LCD monitor In FFT analysis mode and time waveform (TIME) mode screens, the cursor position is controlled via the touch panel.
	Screen resolution	QVGA（320×240）
	Backlight	Turns off or adjusts the brightness in two levels.
	TIME/FFT/VM (bar graph) update cycle	Min. 100 ms
	Numeric value update cycle	1 s
	TIME/FFT	Overlapping display function：A function to overlap the selected FFT/TIME measurement results from the [Recall] screen onto the graph Top 10 list (FFT Analysis mode)：OFF, TOP10, PEAK10 Zoom：Vertical and horizontal axes of the graph can be zoomed in.
Languages	English, Chinese, Japanese	
Overload indication	Notifies under the following conditions for each measurement mode: VM (vibration meter), TIME (time waveform), and FFT analysis. Notifications are provided respectively for ACC, VEL, DISP, and envelope. OVER is displayed for a signal input that is larger than the upper measurement limit. Range1　　＝ Acceleration(rms)：106.0 m/s², Velocity(rms)：335.2 mm/s, Displacement(EQP-P)：9.481 mm Range2　　＝ Acceleration(rms)：335.2 m/s², Velocity(rms)：1060 mm/s, Displacement(EQP-P)：29.98 mm Range3 to 7　＝ Acceleration(rms)：1060 m/s², Velocity(rms)：3352 mm/s, Displacement(EQP-P)：94.81 mm	
Manual store (Starts/stops measurement manually.)	Vibration meter (VM) mode	Records acceleration, velocity, displacement, and crest factor.
	Time waveform (TIME) mode	Records the time waveform for one frame.
	FFT analysis mode	Records the instantaneous spectrum or spectral average results for one frame.
Operation lock / Key lock	Key lock	Restricts key operations except for key lock release.
	Operation lock	Restricts changes to settings related to measurements. A password can be set to unlock the restrictions.
Screenshot	Captures the current display on the screen and saves the image as a BMP file.	
Index	Can be set as a 4-digit.	
Data recall	Browses stored data and screenshot images.	
Memorizing and recalling settings	Setting information can be saved to the internal memory or SD card and recalled at startup or at a specified time. Recorded settings can be renamed (up to 8 alphanumeric characters) to suit the application.	
SD card formatting	Initializes the contents of the SD card to free up space so that you can use it.	
Communication	USB	Connector：USB Type-C Command control：Settings can be retrieved and changed via communication commands. Data transfer：Enables the transferring of data by making the computer recognize the SD card as a
	LAN	The unit communicates with an IP address specified by the user or automatically assigned by the router to provide the following functions. Command control：Settings can be retrieved and changed via communication commands. Data acquisition：SD card can be accessed to retrieve data.

Power supply and battery operation time	Power supplied by six AA batteries or external power source	Alkaline battery：Approx. 12 h Ni-MH rechargeable battery：Approx. 12 h (with eneloop pro Ⓡ battery) Current consumption：Approx. 130 mA (at 9 V supply) Measurement conditions：Measure in Vibration meter (VM) mode with communication turned off
	External power source	Type：DC jack (outer −, inner +), USB port (Type-C) Operating voltage：DC jack: 5.7 V to 15 V (recommended rated voltage 12 V), USB：5 V(operates at rated current of 2.0 A or more) Power consumption：Approx. 1.5 W (with AC adapter NE-21P)
Operating temperature range, storage temperature range	Main unit	−10 °C to +50 °C, 10% to 90% RH (no condensation)
	Piezoelectric accelerometer PV-57I	−20 °C to +70 °C, 90% RH or less
Dimensions	Without protective cover	Approx. 238.9 mm (H) × 80 mm (W) × 44.5 mm (D)
	With protective cover	Approx. 240.7 mm (H) × 91.9 mm (W) × 47.9 mm (D)
Weight	Approx. 665 g (including protective cover, batteries, and PV-57I)	
Supplied accessories		• Piezoelectric accelerometer PV-57I ×1 • Curled cable (Attached to the PV-57I) ×1 • Magnet attachment VP-53S ×1 • PV-57I calibration chart ×1 • Shoulder strap ×1 • Size AA alkaline battery ×6 • Instruction Manual: Quick Start Guide (English) ×1 • Instruction Manual: Quick Start Guide (Japanese) ×1 • 512 MB SD card ×1 • Document for China RoHS ×1 • Supplied Accessories and Inspection Certificate ×1
Optional accessories		• Function extension program VX-14S • 512 MB SD card • 2 GB SD card • 32 GB SD card • Accelerometer PV series • Charge converter VP-40/VP-42 • BNC adaptor VP-52C • AC adapter (100 V to 240 V AC) NE-21P • DC Polarity Converter CC-43J • BNC pin output cable CC-24 series • Hand strap VA-14-020 • Carrying case VA-14-021 • Calibration exciter VE-10 • Waveform analysis software AS-70 • Waveform analysis software CAT-WAVE • Microphone preamplifier NH-22A • 1/2-inch electret microphone UC-59