Tri-axial Groundborne Vibration Meter VM-56

Simultaneous PPV, VDV, Dominant Frequency & Displacement

Tri-axial Groundborne Vibration Meter
VM-56

The VM-56 is a groundborne vibration meter capable of simultaneously calculating the measurement quantities defined by DIN 45669-1, ISO 8041 and other national measurement standards. Like other Rion products, it is characterized by excellent build-quality and exceptional ease of use. It is suitable for a wide range of applications including attended measurements, unattended surveys and live-to-web monitoring.

Applicable standards

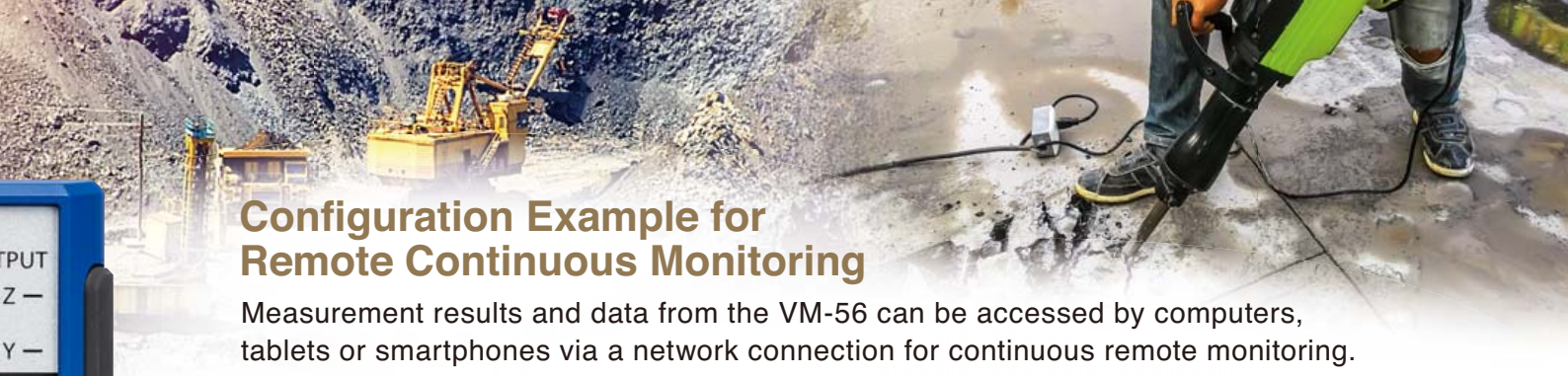
DIN 45669-1 : 2010-09
(Measurement of vibration immission –Part 1: Vibration meters – Requirements and tests)
＊Measurement range, measurement frequency range only

ISO 8041 : 2005, ISO 8041-1 : 2017
(Human response to vibration – Measuring instrumentation)

High Quality & Easy of Use

Features

- Simultaneous measurement of multiple parameters including PPV and VDV.
- Simultaneous tri-axial measurement. Compact and lightweight design.
- Data stored as CSV files on an SD card.
- User definable PPV vs Frequency comparator output supports DIN 4150: Part 3 and other frequency-dependent PPV building damage criteria.
- Flexible product configuration with waveform recording function and 1/3 octave band analysis function available as optional programs.
- Suitable for use in a live-to-web system (please contact us for further details).



Configuration Example for Remote Continuous Monitoring

Measurement results and data from the VM-56 can be accessed by computers, tablets or smartphones via a network connection for continuous remote monitoring.

Mounting options

DIN Plate
VP-54D

L-bracket
VP-54L

Option programs

Waveform Recording Program VX-56WR

Allows recording vibration waveforms on SD card as WAV files. The recording process is carried out simultaneously with the standard VM-56 functions.

2 kHz sampling with 24 bit or 16 bit can be selected

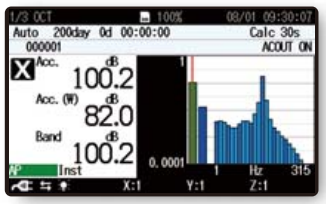
Max. recording time (at 16 bit)

Sampling frequency \ Memory card	512 MB	2 GB	32 GB
2 kHz	Approx. 8 hours	Approx. 32 hours	Approx. 698 hours

1/3 Octave Band Analysis Program VX-56RT

Enables measurement and logging of 1/3 octave acceleration levels simultaneously with broadband parameters (e.g. PPV, Dominant Frequency, VDV, MTVV). Can be used concurrently with VX-56WR.

User definable weighting – enables compliance with ISO 2631-2:1989/RD1367

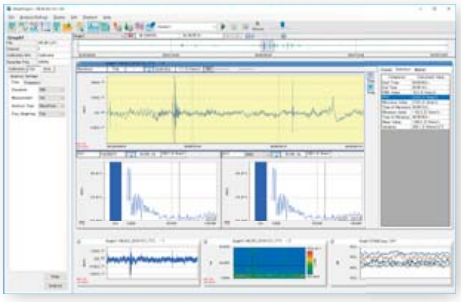


1/3 Octave Band Analysis screen

Software / Report Creation

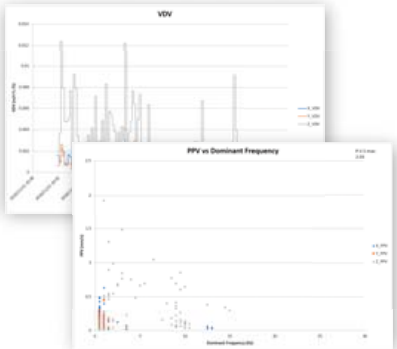
Waveform Analysis software for Groundborne Vibration AS-70GV

Allows use of WAV files recorded with VM-56 + VX-56WR for graph display, level processing, frequency analysis (octave band analysis / FFT analysis), recalculation (PPV, KB, VDV), and file output.



Excel macro for report output (Free of charge･Now available on our website)

Facilitates the creation of reports from measurement data.



- Data types:
  VM-56 auto store data,
  VX-56RT auto store data
  ＊Manual store data are not supported
- Measurement target:
  PPV, displacement, acceleration (rms), VDV, MTVV, KB_{FT} value, $v_{eff,max.30}$ value

Specifications

Applicable standards	DIN 45669-1: 2010-09 (Frequency, Measurement range compliance), SBR Meten en beoordelen van trillingen, Deel A: Schade aan gebouwen 2010, Deel B: Hinder voor personen 2013, ISO 8041: 2005, ISO 8041-1: 2017, CE marking, WEEE directive
Measurement functions	Tri-axial simultaneous measurement
Measurement values	
In accordance with DIN	Peak particle velocity |v|max (PPV) Dominant frequency fmg (D.F.) Weighted vibration maximum value KB_{Fmax} Maximum KB_F value over 30-second cycle KB_{FT}
In accordance with ISO	Corrected acceleration effective value Acc. Maximum transient vibration value MTVV Vibration dose value VDV Crest factor C.F.
In accordance with SBR	Maximum weighted vibration value $v_{eff,max}$ Maximum veff over 30-second cycle $v_{eff,max,30}$
Others	Displacement (0-p value) Disp. Combined PPV for 3 axes PVS
Waveform recording (Option)	Time waveform of acceleration signal a(t)
1/3 octave band analysis value (Option)	Time-weighted time average, maximum acceleration Tri-axial synthesis of band max overall L_{aw}
Measurement frequency range	0.5 Hz to 315 Hz
Frequency bandwidth limits	For acceleration, velocity, and displacement signals, the following frequency range limits can be selected. Lower limit: 0.5 Hz, 1 Hz, 4 Hz Upper limit: 80 Hz, 100 Hz, 250 Hz, Sensor Dependent (LPF OFF)
Measurement range	Measurement frequency setting is 1 to 80 Hz, defining the following range
Measurement range for VM-56	Vibration velocity: 0.03 to 100 mm/s Weighted vibration amount: 0.02 to 100 mm/s (Reference 16 Hz) Maximum absolute waveform value: 0.05 to 100 mm/s (Reference 16 Hz) Vibration acceleration: 0.0003 to 10 m/s² Displacement (0-p): 0.01 to 10 mm (0.5 to 4 Hz)
	Measurement range compliant with SBR-Deel B Vibration velocity: 0.02 to 100 mm/s (Frequency bandwidth 1 to 80 Hz)
Instrument noise	
Vibration acceleration	0.0001 m/s² (Measurement frequency range 1 to 80 Hz)
Vibration velocity	Max. 0.01 mm/s (Measurement frequency range 1 to 80 Hz)
Frequency correction	No weighting (Common band filter for ISO and DIN / SBR band filter) KB (DIN 45669-1 compliant) Wb, Wd, Wm characteristics (ISO 8041 compliant) Hv (SBR-B compliant)
Measurement range	2 switchable ranges, separate for 3 axes: 0.001 to 10 m/s², 0.0001 to 1 m/s²
Dynamic range	Max. 100 dB
Sampling frequency	2 kHz
Store modes	3 modes (Manual, Auto, Timer Auto), Data format: CSV
Manual	Measurement results stored with measurement start time in one memory address Data stored in internal memory or on SD card (Internal memory: max. 1000 tri-axial data sets, SD card: dependent on card capacity) Processed value store: PPV, Dominant Frequency (D.F.), KB_{Fmax}, MTVV, VDV, Crest Factor (C.F.), Displacement (Disp.), PVS, Overload and Under Range Flags for each calculation cycle.
Auto	Continuous storing of various types of processing results for each calculation cycle Data stored on SD card Store modes: Instantaneous store, calculation store, level trigger store ・Instantaneous store: Acc. rms data stored every 100 ms ・Processed value store: PPV, Dominant Frequency (D.F.), KB_{FT}, MTVV, VDV, Crest Factor (C.F.), Displacement (Disp.), PVS, Overload and Under Range Flags for each calculation cycle. ・Calculation cycle: 1 s to 24 h
Timer Auto	Processed values are continuously recorded for each store cycle at the set measurement start / stop time. Sleep function (power save mode until measurement start) available Data stored on SD card Store modes: Instantaneous store, Calculation store ・Instantaneous store: Acc. data stored every 100 ms ・Calculation store: Processing results for each calculation cycle ・Calculation cycle: 1 s to 24 h
Measurement time	Max. 200 days (Auto store mode only, with 100 ms off)
Data recall	Store data name, store data browse, time browse, waveform yes/no check
Setting memory	Up to 5 sets of settings can be stored in internal memory and on SD card, for later recall Startup with settings stored in a file on the SD card possible
Clock function	Year/Month/Day/Hour/Minute/Second, Daily error ±1 s, 10 ppm
Display	Backlit semi-transparent color TFT LCD, WQVGA resolution (400 x 240 dots) Language: English only
Alarm indication	Signal overload indication, signal underload indication
Signal output	2.5 dia. output jacks, 3 separate channels
AC output	AC output: 1 Vrms (full-scale) Frequency weighting for instantaneous value display and for AC output can be set separately Frequency range: 0.5 to 315 Hz
USB	Mass storage class: SD card recognized as removable disk Communication device (virtual COM port): Supports command based communication
RS-232C communications	Using dedicated cable (I/O terminal)
Comparator output	Open-collector output (using I/O port) Max. applied voltage: 24 V Max. drive current: 50 mA (with 24 V applied voltage) Monitored Parameter: PPV (broad-band or user-definable PPV vs frequency function) ＊3
Power requirements	IEC R6 [size AA] battery x 8 or external power supply
Battery life (23 °C)	Alkaline battery LR6 (AA): 24 h , Ni-MH secondary battery: 24 h ＊Battery life will differ depending on settings.
AC adapter	NC-98series
External power supply voltage	5 to 7 V (rated voltage 6 V)
Current consumption	Approx. 90 mA with factory default settings
Power consumption	Approx. 7 VA on input side (220 V AC side)
Dust and water proofing	IP54 rating (for main unit) ＊2
Ambient conditions for operation	-20 °C to +50 °C, 90 % RH or less (no condensation)
Dimensions and weight	Approx. 175 mm (H) x 175 mm (W) x 40 mm (D) mm, approx. 780 g (incl. batteries)
SD card	SD / SDHC (max. capacity 32 GB) ＊1
LED	Two-color (red/blue) type for operation status indication
Supplied accessories	Accelerometer PV-83D, Alkaline battery, IEC R6 (size AA) x 8, Case x 1, 512 MB SD card x 1, Calibration Certificate
Accelerometer Tri-axial Accelerometer PV-83D (Cable: 1.5 m)	Rated sensitivity: 60 mV/(m/s²) Frequency range: 0.5 Hz to 315 Hz Usage temperature range: -20 °C to +60 °C (no condensation) Waterproofing: IPX7 Dimensions and weight: Approx 67 mm (dia.) x 50.5 mm (D), approx. 450 g

Waveform Recording Program VX-56WR

Recorded signal	Acceleration
Sampling frequency	2 kHz
Bit word length	24 bit, 16 bit

Data format	WAV format
Frequency correction	None
Available channels for recording	3 channels (X, Y, Z)

1/3 Octave Band Analysis Program VX-56RT

Analysis Basis	Acceleration
Applicable standards	IEC 61260-1 2014 class 1, ISO 2631-2*, RD1367* ＊With user weighting
Filters	1 Hz to 315 Hz (26 bands)
Frequency weighting	None (band-limiting filter only) (Wb, Wd, Wm, User weighting)
Store modes	Same store modes as VM-56, same processing values are stored. Processing values listed below are also stored.
Manual	Time average of 1/3 octave Acc for each calculation cycle, and time-weighted maximum value
Auto/Timer Auto	Instantaneous store: Time-weighted instantaneous value of 1/3 octave Acc. every 100 ms Calculation store: Time average of 1/3 octave Acc. for each calculation cycle, and time-weighted maximum value
Analysis target channels	3 channels simultaneously (X, Y, Z)
User Weighting	Enables the user to set amplitude weightings for 1/3 octave band: Frequency range: 1 Hz to 315 Hz Adjustable range: +3.00 dB to -70.00 dB

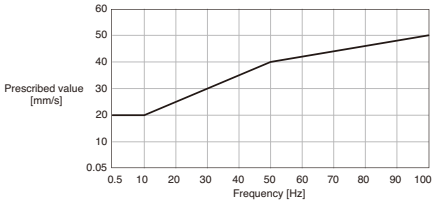
Options

Product	Model
Waveform Recording Program (supplied on 2 GB SD card)	VX-56WR
1/3 Octave Band Analysis Program (supplied on 512 MB SD card)	VX-56RT
Waveform Analysis Software for Groundborne Vibration	AS-70GV
512 MB SD card	＊1
2 GB SD card	
32 GB SD card	
AC adapter	NC-98series
7P Extension Cable	EC-04 series
BNC to RCA Cable	CC-24
Comparator Cable	CC-42C
RS-232 Serial I/O Cable	CC-42R
USB Cable	—
DIN plate	VP-54D
L-bracket	VP-54L

＊1 Use RION fully guaranteed products.
＊2 Protection against harmful dust and water splashing from any direction.

Precautions regarding waterproofing
Before use, verify that the rubber side cover and the battery compartment lid are firmly closed.
To maintain the water and dust proof rating, internal packing replacement is required every two years (at cost).

＊3 Example of frequency-dependent comparator setting



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This product is certified to an International Protection rating of IP54 (dust protected and resistant to splashing water).
This leaflet is printed with environmentally friendly UV ink.

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