Vibration Analyzer VA-14

RION CO., LTD.
http://www.rion.co.jp/english/

Instruction Manual　Quick Start Guide

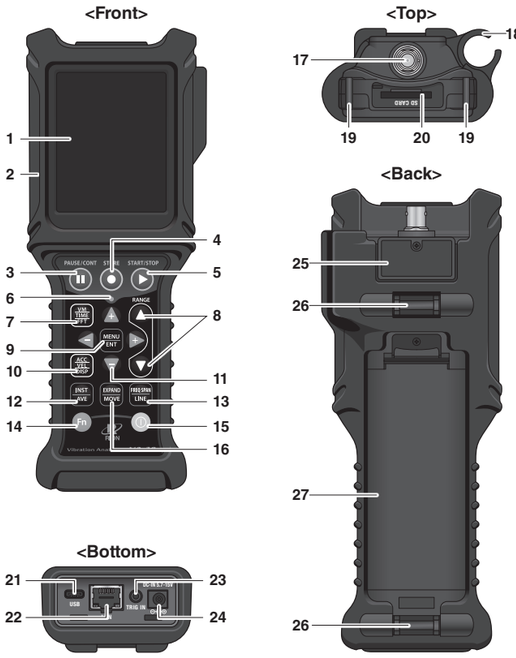
- Before using this product, read the “Safety Precautions” carefully and use it correctly.
- Keep this manual in a safe place for future reference.

Organization of the Instruction Manual

- Quick Start Guide (this document)
- Operation Guide

You can download the Instruction Manual from our website:
https://svmanual.rion.co.jp/va-14_e/

Name of Each Part



No.	Name/Description
1	**Display** Shows measured data, menu screens and other information.
2	**Protective cover** A cover to protect the unit.
3	**PAUSE/CONT key** Serves to pause and resume the measurement. Also press to use the pause function.
4	**STORE key** Serves to store data on SD card.
5	**START/STOP key** Serves to start and stop the measurement. The key is also used to return to the measurement screen from the menu screen.
6	**Indicator LED** Shows operation and status information for the unit by blinking in red and blue.
7	**VM/TIME/FFT key** Serves to select the analysis mode.
8	**RANGE △/▽ keys** These keys serve to select the input range for measurement.
9	**MENU/ENT key** Press to display the menu or confirm a selection on the menu screen.
10	**ACC/VEL/DISP key** Serves to select measurement data type (acceleration/velocity/displacement/envelope).
11	**△/▽/◁/▷ keys** These keys are used for various functions, such as selecting menu items, moving the cursor, changing the display zoom factor, changing the storage address, etc.
12	**INST/AVE key** In FFT analysis mode, this key serves to switch between the instantaneous value display and the calculation type selected from a menu (linear average, exponential average, maximum hold).
13	**FREQ SPAN / LINE key** Serves to change the frequency span or number of analysis lines in time waveform (TIME) mode and FFT analysis mode.
14	**Fn key** Press to execute the function assigned to the Function (Fn) key. You can assign it to Recall, Backlight, Screenshot, Filter settings, or Save/Load settings.
15	**POWER key** Serves to turn the unit on and off.
16	**EXPAND/MOVE key** When display scaling is enabled, this key serves to switch between zoom (expand/shrink) mode and move mode.
17	**Accelerometer connector** The supplied Piezoelectric accelerometer PV-57I or another accelerometer is to be connected here. (Other supported accelerometers include PV-91C, etc.)
18	**Accelerometer holder** A holder for storing the accelerometer.
19	**Shoulder strap attachment part** Attach the shoulder strap (accessory) for drop prevention.
20	**Card slot** A slot for inserting an SD card.
21	**USB port (Type-C)** A port for connecting a computer or mobile battery.
22	**LAN port** A port for connecting a computer or router.
23	**TRIG IN connector** Used for inputting an external trigger signal. This enables control over the measurement.
24	**External power supply port (DC IN)** By connecting the optional AC adapter NE-21P, the unit can be used with 100 V to 240 VAC.
25	**Nameplate** The serial number and the model of the main unit are indicated.
26	**Hand strap attachment part** Attach the hand strap (optional accessory) for drop prevention.
27	**Battery compartment** Install six AA batteries to use the unit. There is a power-on mode switch in the battery compartment.

Safety Precautions

The precautions shown here are intended to help you use the product safely and correctly, and to prevent harm and damage to you and other people. Incidents that could occur as a result of incorrect handling are divided into two categories: “WARNING” and “CAUTION.” Make sure to follow the contents of all these categories because they are serious matters related to safety.

Examples of pictorial indications

⃠	**Prohibitions**	❗	**Instructions**

⚠ WARNING	Indicates a possibility of death or serious injury due to incorrect handling.
⚠ CAUTION	Indicates a possibility of personal injury or property damage due to incorrect handling.

• Handling of the batteries

⚠ WARNING

❗ **If electrolyte leaking from the batteries gets into your eyes, rinse with water without rubbing and immediately seek medical attention.**
Failing to do so may result in blindness.

If electrolyte leaking from the batteries gets on your skin or clothes, wash it off immediately with water.

• Handling of this product

⚠ WARNING

Never disassemble, repair, or modify the unit.
Doing so may cause a fire, electric shock, or an accident.

Do not connect the power cable or remove the main unit with wet hands.
Doing so may cause electric shock or injury.

Do not immerse the main unit in water or splash water on it.
The unit is not waterproof, so immersing it in water or splashing it with water may cause electric shock or malfunction.

Do not use the unit for purposes other than for what it is originally intended.

Keep the unit away from heat sources such as fire and stoves.
Failure to do so may cause a fire, electric shock, or malfunction.

Do not use the unit if any abnormality such as damage is discovered.
Continuing to use the unit regardless of an abnormality may cause electric shock or fire.
In such circumstances, please contact your dealer or the Repair and Recalibration Contact.

Do not use the unit if there is something wrong with it, such as it becomes abnormally hot.
Doing so may result in a malfunction or fire.

Do not use or connect to the power supply in a humid place such as a bathroom or in a place where it may get wet.
Doing so may cause electric shock or malfunction.

Do not use, store, or leave the unit in a hot place such as in a place exposed to fire, direct sunlight, or inside a car on a hot day.
Doing so may cause fire, battery breakage, or overheating.

When disposing of the unit, it should not be incinerated.
Doing so may cause a fire or the batteries to explode. When disposing of the unit, follow the regulations of your country or local municipality.

Do not use the power cable connected to the optional AC adapter with a voltage other than 100 VAC.
The power cable connected to the AC adapter is a 100 VAC compatible cable that conforms to electrical safety standards.
We cannot guarantee the safety of the unit if it is used with a voltage other than 100 VAC.
Use a power cable that is compliant with the laws and electrical safety standards of your location.

When making measurements on exposed rotating parts or power train parts of machinery, do not use the shoulder strap.
If the strap gets caught in the machine, it could lead to a dangerous accident.

❗ **If there is dust on the external power supply port, wipe it off before connecting the AC adapter.**
Failure to do so may result in electric shock, short circuit, or fire.

Wipe off any water on the main unit and the external power supply port before connecting to the power supply.
Failure to do so may result in electric shock, short circuit, or fire.

If there is a problem with the unit during use, turn off the power and disconnect the AC cable and remove the batteries.
In such circumstances, please contact your dealer or the Repair and Recalibration Contact.

Always turn off the power after use.
Turn off the power and remove the batteries if you intend to store the unit for a long time without using it. Leaving the batteries inside the unit may cause electrolyte to leak. Disconnect the AC adapter as well.

❗ **Always hold the plug or connector when disconnecting a cord or cable.**
Do not apply excessive force, such as holding the cord or cable and pulling it out.

When making measurements on exposed rotating parts or power train parts of machinery, proceed with utmost care to ensure that the accelerometer or accelerometer cable does not get caught in the machine.

⚠ CAUTION

⃠ **Do not use or store the product within the reach of children or pets.**
Doing so may result in electric shock, injury, or accidental ingestion.

Do not store the unit in places in which it will be subject to water, dust, high temperatures, and high humidity, or in direct sunlight. Do not use or store the unit in places where it may be adversely affected by salt, sulfur, chemicals, gases, etc.
The operating temperature for this unit is -10°C to +50°C and the humidity range is 10% to 90% RH.

*In the event of a product defect caused by Rion, Rion will repair or replace the unit.

Precautions for Use

- Avoid using and storing the unit in places with high temperatures and humidity, or in places exposed to direct sunlight for long periods of time.
- If there is a drastic change in the surrounding temperature, the unit may malfunction due to internal condensation.
- As the unit is a precision electronic device, avoid using or storing it in locations subject to shock or vibration.
- If you do not intend to use the unit for a long time, remove the batteries, and store it.
- Do not insert wires, metal pieces, conductive plastics, etc. through any holes or gaps of the unit. Doing so may result in a malfunction.
- If you are using the unit outdoors and it starts raining, stop measuring and keep the unit dry. If the unit gets wet, wipe it off with a dry cloth and dry it in a well-ventilated environment.
- We recommend storing the unit in its designated location within the carrying case, which is optional accessory.
- The touch panel surface is easily damaged, so do not poke or hit it with an object such as a pen, pencil, or screwdriver.
- To maintain the accuracy of measurements, inspect the unit regularly. In such circumstances, please contact your dealer or the Rion sales department (see back side).
- Be aware that removing the sticker seals will cause the unit to be no longer subject to the warranty.
- The rechargeable backup battery for the clock of this unit is a consumable item. We recommend regularly replacing this battery (for a fee). For replacement of the rechargeable battery, please contact your dealer or the Repair and Recalibration Contact (see back side).
- Be sure to turn off the power before inserting or removing the SD card.
- Never format the optional program card such as VX-14S with SD card formatting software (such as SD Formatter). Otherwise, the program data on the card will be erased and can no longer be used. Restoration of the erased program is not guaranteed. Note that using the formatting function of the unit or the formatting function provided in the computer’s operating system is acceptable and will not cause any issues.

[Disclaimer]

- Rion shall not be held accountable for the following damages:
  Any damage caused by earthquakes, lightning, wind and floods, fires for which Rion is not responsible, actions or accidents by a third party, intentional or negligent misuse by the customer, or use under other abnormal conditions.
- Rion shall not be held accountable for the following incidental damages arising from the use or inability to use this product.
  Alteration or loss of recorded content, loss of business profits, or the interruption of business, etc.
- Rion shall not be held accountable for any damage caused by not following the contents of this document.

[Cleaning the unit]

- To clean the unit, use a dry, soft cloth or a cloth wrung out with lukewarm water. Do not use organic solvents such as benzene or alcohol.

[What to do when disposing of the unit]

- When disposing of this product or batteries, make sure to consult with your local municipality.

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
RoHS 2 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
Connectors and types, 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
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 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

- **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 installed)
• 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 be set individually for acceleration, velocity, and displacement.

- **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
Both linear average and maximum value can be calculated and saved simultaneously.

- **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 calculations

- **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.

- **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.

- **Languages**

English, Chinese, Japanese

- **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.

- **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 removable disk.

• 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
Current consumption	Approx. 130 mA (at 9 V supply)
Measurement parameters	Measure in Vibration meter (VM) mode with communication turned off and backlight off, in a low-vibration environment.

• External power source

Type	DC jack (outer: –, inner: +), USB 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
Sensitivity calibration chart	×1
Shoulder strap	×1
AA alkaline battery	×6
Instruction Manual: Quick Start Guide (Japanese)	×1
Instruction Manual: Quick Start Guide (English)	×1
512 MB SD card	×1
Supplied Accessories and Inspection Certificate	×1
Document for China RoHS	×1

Optional Accessories

Function extension program	VX-14S	BNC-Pin output cable	CC-24 series
512 MB SD card		Hand strap	VA-14-020
2 GB SD card		Carrying case	VA-14-021
32 GB SD card		Calibration exciter	VE-10
Accelerometer	PV series	Waveform analysis software	AS-70
Charge converter	VP-40/VP-42	Waveform analysis software	CAT-WAVE
BNC adapter	VP-52C	Microphone preamplifier	NH-22A
AC adapter	NE-21P	1/2-inch electret microphone	UC-59
DC Polarity Converter	CC-43J		

- **About EMC technical documentation**

This product complies with the EMC standard EN IEC 61326-1:2021. The EMC technical documentation for this product can be found in the Instruction Manual, Operation Guide.
https://svmanual.rion.co.jp/va-14_e/
If you are unable to access the website, please contact customer support for assistance.

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