

Multi-function Measuring System Platform SA-A1

RIONOTE



Groundbreaking multi-function measuring system from RION
Compact design, easy and intuitive operation,
with the dedicated program of your choice.
Continuous application development further enhances the system's potential!

- Color LCD touch screen allows intuitive operation.
- B5 size ideal for measurements in the field.
Light weight: only 1.2 kg including amplifier and battery.
- Powered by a rechargeable lithium ion battery.
Battery can be easily exchanged in the field.
- IP54 water-resistant rating for main unit.

Main Control Unit SA-A1 and Amplifier SA-A1B4/B2

Supports direct connection of microphones and piezoelectric accelerometers.



Sensor amplifier slides into the underside of main unit



Portable Multi-function Measuring System

RIONOTE

RIONOTE System Configuration

Selectable

4 Channel Amplifier SA-A1B4

(4 input channels + Rotation pulse input)

2 Channel Amplifier SA-A1B2

(2 input channels + Rotation pulse input)



Rotation pulse input / General purpose DC input

1/2 inch electret condenser microphone UC-52/57/59

Preamplifier NH-22A

BNC-BNC Coaxial Cable EC-90 Series

1 inch sound field type electret microphone (with preamplifier) UC-35P

* Requires CCLD 4 mA modification of amplifier

BNC-BNC Coaxial Cable EC-90 Series

Accelerometer PV-91C/91CH **With amplifier**

Accelerometer Cable VP-51 Series

BNC Adapter VP-52C

Accelerometer PV-08A/85/90H etc.

Accelerometer Cable VP-51 Series

Charge Converter VP-40

Accelerometer PV-08A/85/90H etc.

Accelerometer Cable VP-51 series

Charge Converter VP-42

BNC Adapter VP-52C

Accelerometer (Triaxial type) PV-97C/193*

* When using a 3-axis accelerometer, three VP-40 units are required, one for each axis.

Charge Converter VP-40

Sound level meter

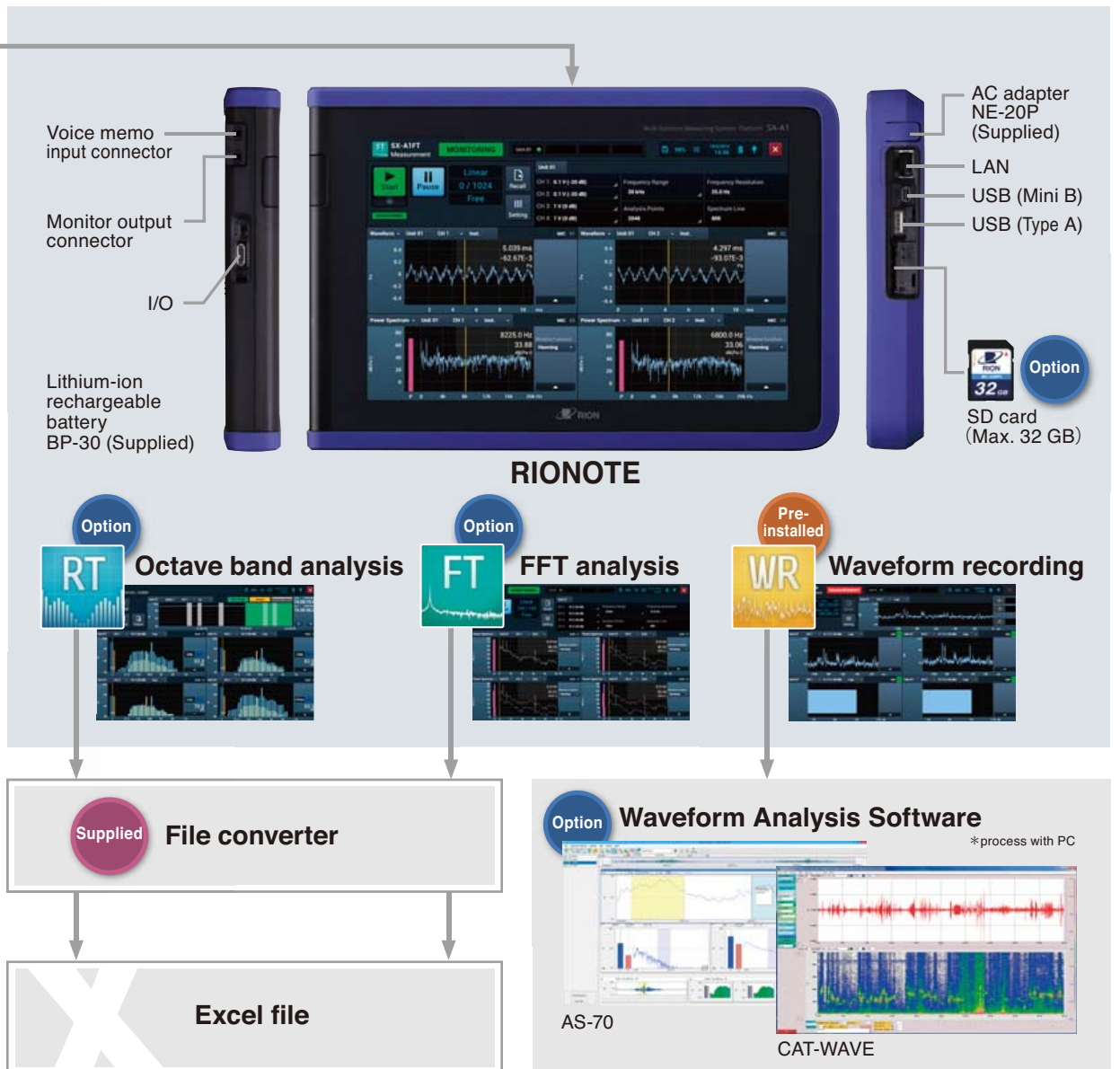
Vibration meter

Vibration level meter

Impulse hammer

Rotation, distortion, temperature, etc.

RIONOTE System Configuration





RIONOTE Program for FFT Analysis SX-A1FT

FFT Analysis

This program enables FFT analysis. The setup procedure is simplified by automatic calculation of frequency resolution. Time waveform of one frame time, the result of FFT analysis, and calculation across channels can be displayed. It is also easy to compare each frequency result using the overlay display function. Moreover, RIONOTE supports simultaneous FFT analysis and waveform recording. The recorded waveform data can be played back using the earphone jack output, making it easy to pinpoint a time period for analysis.



SX-A1FT, RIONOTE Program for FFT Analysis

General real-time analysis processing		
Processing outline	FFT analysis (non-continuous frames when used in real time)	
Waveform recording function	Simultaneous analysis and waveform recording supported	
Trigger	Trigger modes	Free, Single, Repeat
	Trigger source	Waveform, External, Rotation speed
	Trigger position	$\pm \frac{1}{N}$ (N: number of analysis points)
Arithmetic functions	Time domain waveform for 1 frame, Power spectrum, Cross spectrum, Transfer function, Coherence	
Window functions	Rectangular, Hanning, Flat-top, Exponential, Force	
Analysis frequencies	20 kHz, 10 kHz, 5 kHz, 2 kHz, 1 kHz, 500 Hz, 200 Hz, 100 Hz	
Number of analysis points	256, 512, 1 024, 2 048, 4 096, 8 192, 16 384, 32 768	
Averaging and other processing functions	Linear, Exponential, Max Hold	
General post-analysis processing		
Outline	FFT analysis of WAVE files recorded with WR function	
Arithmetic functions	Time waveform for 1 frame, Power spectrum, Cross spectrum, Transfer function, Coherence, Partial overlap	
Window functions	Rectangular, Hanning, Flat-top, Exponential, Force	
Number of analysis points	1 024, 2 048, 4 096, 8 192, 16 384, 32 768	
Overlap ratio	0 %, 25 %, 50 %, 75 %	
Averaging and other processing functions	Linear, Exponential, Max Hold	
File type	Binary file*	

- *1 16 384 analysis point setting not supported during waveform recording
- *2 RIONOTE binary file can be converted to text/csv file with file converter (supplied).
- *3 Real time overlay display across channels is an option.

Transfer function

A transfer function represents the relation between an input signal and output signal in the frequency domain, allowing the determination of amplitude and phase.

In this mathematical calculation category, RIONOTE supports the coherence function and cross spectrum processing.



RIONOTE Program for 1/3 Octave Analysis SX-A1RT



1/3 octave band analysis

This program enables 1/1 and 1/3 octave band analysis. The instantaneous value, L_{eq} , percentile sound level, and a top ten list of frequency bands can be displayed. It is also easy to compare each frequency result using overlay display. The recall function shows the frequency fluctuation of every 100 ms. Moreover, it is possible to evaluate only the required noise event by using the excluding function for unrelated noise events.

SX-A1RT, RIONOTE Program for 1/3 Octave Analysis

Standard compliance	JIS C1513 Class 1, JIS C1514 class 1,	
	IEC 61260-1:2004 class 1, ANSI/ASA S1.11-2014/Part 1 class 1	
Band filter center frequencies and number of bands		
Octave bands	0.5 to 16 000 Hz, 16 bands Max. 4 channels	
1/3 octave bands	0.4 to 20 000 Hz, 48 bands Max. 3 channels	
Instantaneous value data (every 100 ms)	Time weighted level L_p , Time averaged level L_{eq} , Time weighted maximum level L_{max}	
Processing value data	Time averaged level L_{eq} , Sound exposure level L_E , Time weighted maximum level L_{max} , Time weighted minimum level L_{min} , Time percentile level L_N (5, 10, 50, 90, 95, 33.3), max. 5 values	
Store function	Auto/Manual	
Time weighting characteristics	F (Fast) 125 ms, 630 ms, S (Slow) 1 s, 10 s	
Frequency weighting characteristics	A, C, Z	
Trigger	Trigger modes	Free, Single, Repeat
	Trigger source	AP level, Band level, External signal, Time
File type	Binary file*	

- * RIONOTE binary file can be converted to text/csv file with file converter (supplied).



* Maximum number of channel is 3 for 1/3 octave band analysis.
 * This image shows "ch1 Lmax" in the fourth display window.

Data Management Software For Environmental Measurement AS-60RT

Complete software for environmental measurements



RIONOTE Program for Waveform Recording SX-A1WR

Pre-installed in RIONOTE



Waveform recording

By using the waveform recording program, it is possible to display and record the time waveform of the incoming signal(s). Available recording time depends on the number of input channels and the selected frequency range.

SX-A1WR, RIONOTE Program for Waveform Recording

Number of recording channels	1 to 4 channels + rotation or general purpose DC	
Frequency range	20 kHz, 10 kHz, 5 kHz, 1 kHz, 500 Hz, 100 Hz	
Quantization	16 bit/24 bit	
Trigger	Trigger modes	Free, Single, Repeat
	Trigger source	Waveform, Time, External, Rotation speed
Voice memo marker function	Yes	
Monitor output (playback)	Allows listening to recorded data (51.2 kHz, 25.6 kHz, 12.8 kHz only)	
Recorded data	WAVE format	

Maximum recording time

32 GB SD card, Sampling frequency: x2.56 (2.4 also supported), Quantization: 16 bit

- 4 channel, 20 kHz: 21 h 20 m
- 2 channel, 10 kHz: 85 h 20 m

2 GB SD card Sampling frequency: x2.56 (2.4 also supported), Quantization: 16 bit

- 4 channel, 20 kHz: 1 h 20 m
- 2 channel, 10 kHz: 5 h 20 m

Waveform Analysis Software

Data recorded with SX-A1WR can be displayed and analyzed in various software packages

Waveform Analysis Software Option AS-70

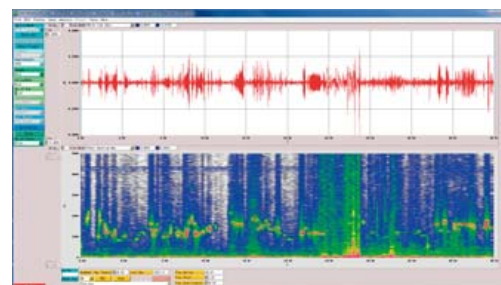


Waveform analysis screen example

Specifications

Waveform analysis	
Processing	Maximum value, Minimum value, Average value, Effective value, Distribution, Differentiation and Integration, HPF, LPF
FFT analysis	
Number of analysis points	32 to 65 536
Data view	Power spectrum, Power spectrum density, Spectrogram
Octave band analysis	
Applicable standards	JIS C 1514 (IEC 61260)
Frequency range	Octave band 0.5 Hz to 16 kHz (16 bands) 1/3 octave band 0.4 Hz to 20 kHz (48 bands)

Waveform Analysis Software Option (This software is a product of Catec Inc.) CAT-WAVE



Spectrum map screen

Specifications

Waveform	
Display	Scaled time axis, Differential and integral calculus available
FFT analysis	
Sampling points	64 to 32 768 points
Display function	Power spectrum, Cross spectrum, Transfer function, Coherence, Power spectrum map, Octave map, Differential and calculus for spectrum area
Octave band analysis	
Applicable standard	JIS C 1514 (IEC 61260) class 1
Frequency range	Octave band 0.5 Hz to 8 kHz (15 bands), 1/3 octave band 0.4 Hz to 10 kHz (45 bands), 1/12 octave band 0.36 Hz to 11 kHz (180 bands)



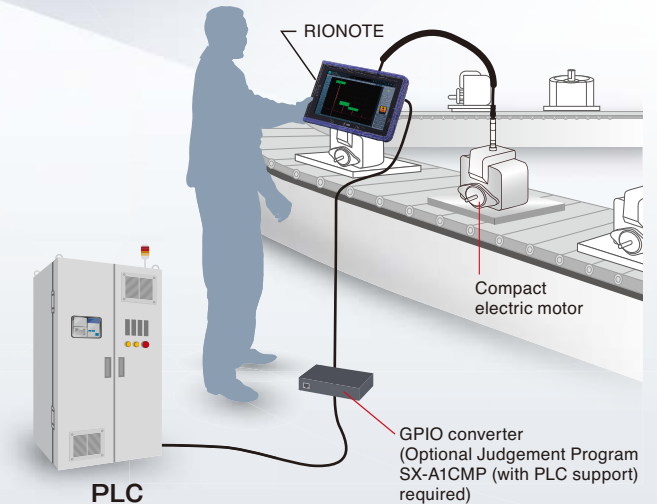
Judgement Program (Pass/Fail Evaluation) SX-A1CMP



Judgement Program (Pass/Fail Evaluation)

Suitable for pass/fail evaluation of noise, vibrations and other phenomena in production or inspection lines. Allows setting threshold areas for FFT analysis results to determine pass/fail. Depending on the evaluation purpose, a suitable sensor can be selected from various types of microphones or accelerometers. Operation control from a PLC is also supported as an option (using the Ethernet connector of the RIONOTE).

System diagram



Vibration Analysis Program SX-A1VA



Vibration Analysis Program

Adds vibration measurement functions. All essential vibration measurement functions are provided, enabling equipment diagnosis and trend management for industrial machinery. The program also supports detailed diagnosis including FFT analysis and envelope processing.

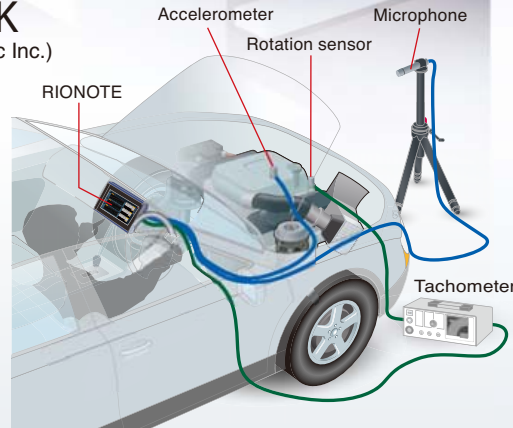
Specifications

Vibration frequency range (using PV-571)	Acceleration: 0.02 to 141.4 m/s ² (rms) Velocity: 0.2 to 141.4 mm/s (rms, at 159.15 Hz) Displacement: 0.02 to 40.0 mm (EQ peak-peak, at 15.915 Hz)
FFT analysis mode	Power spectrum Time waveform of 1 frame
Frequency range	100 Hz, 200 Hz, 500 Hz, 1 kHz, 2 kHz, 5 kHz, 10 kHz, 20 kHz
Number of analysis lines	200, 400, 800, 1 600, 3 200



Order Tracking Program CAT-SAA1-ORDTRK

(This software is a product of Catec Inc.)



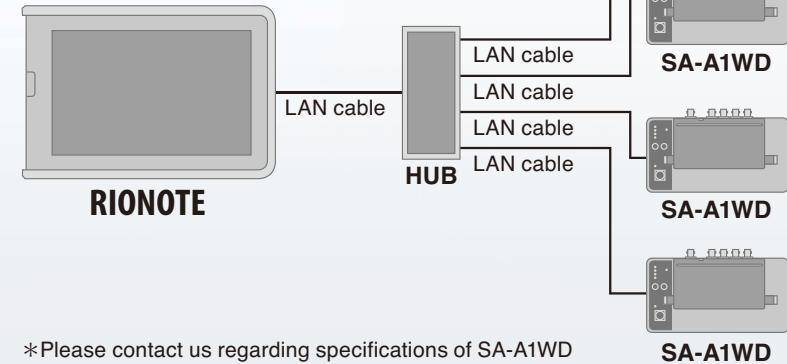
RIONOTE can simultaneously record rotational speed (rpm) data along with sound and vibration waveform data and perform automatic order tracking analysis based on these data.

- Number of channels: SA-A1B4: 3 channels, SA-A1B2: 1 channel *One channel is required for tachometer signal input
- Max. rotational speed (with analysis frequency 20 kHz) 10 000 rpm (at 60 p/r); 600 000 rpm (at 1 p/r)
- Simultaneous overlay display: Up to 4 orders (including overall)

RIONOTE Remote System (LAN)

Using the SA-A1WD amplifier with dock enables measurement at multiple points

- Main control unit can be connected to up to four amplifier units
- Maximum 16 channels

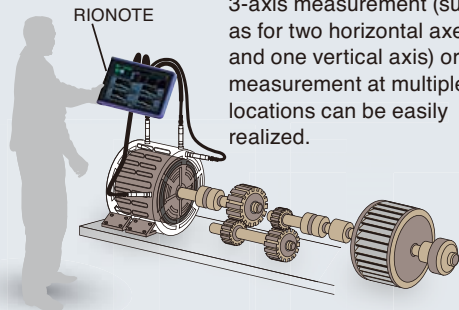


*Please contact us regarding specifications of SA-A1WD

Application Examples

Machine vibration measurement system

RIONOTE can be used for measuring vibrations by connecting a piezoelectric accelerometer. Because the unit supports up to four input channels, simultaneous 3-axis measurement (such as for two horizontal axes and one vertical axis) or measurement at multiple locations can be easily realized.



Measurement and analysis of sound level and vibration level

RIONOTE supports simultaneous measurement of sound level and vibration level, which is realized by connecting both a sound level meter and a vibration level meter to the unit. If required, frequency analysis can also be performed.



Sound/Vibration vs. Rotation Speed Measurement System

Besides its sound and vibration connections, the RIONOTE Multifunction Measurement System is also equipped with a tachometer pulse input which makes it possible to measure and analyze noise and vibrations linked to rotation speed. The illustration below shows a system with two microphones mounted at the ear position of the driver of a vehicle, intended to analyze sound patterns during acceleration. The tachometer pulse input can be used in conjunction with such a setup.





Precautions regarding waterproofing

Before use, verify that the connector cover on the side of the unit is firmly closed. To maintain the water-resistant rating, the internal packing of the enclosure must be replaced every two years (at cost).

This product is environment-friendly. It does not include toxic chemicals on our policy.

This product is certified to an International Protection rating of IP54 (dust protected and resistant to splashing water).



RIONOTE desktop stand



Carrying case

Specifications

RIONOTE Main Control Unit SA-A1, RIONOTE 4 channel / 2 channel Amplifier SA-A1B4/B2

Input section	
Number of channels	4 (2), BNC connectors, CCLD, AC/DC
Max. input voltage	±13 V
CCLD	2 mA 24 V (4 mA factory option)
Amplifier section	
Frequency range	DC to 20 kHz or 0.25 Hz to 20 kHz
Input range	-40 dB to 20 dB, 20-dB steps, 0 dB ref. 1 Vrms
Residual noise	At range full-scale: -85 dB or less (0 dB range, AP level)
Dynamic range	100 dB or better (0 dB range, fs = 51.2 kHz, 400 line FFT noise level)
Phase difference between channels	±1 deg. or less (1 Hz to 20 kHz, same input range)
A/D converter section	
A/D converter	24 bit, delta-sigma type, simultaneous sampling
Sampling frequencies	51.2 kHz, 25.6 kHz, 12.8 kHz, 5.12 kHz, 2.56 kHz, 1.28 kHz, 512 Hz, 256 Hz
Display	
Touch panel	Multi-touch (2 points), projected capacitive type
Input/output section	
USB	USB A x 1, mini B x 1
Earphone jack	Yes, Stereo mini jack, φ3.5
SD card slot	Yes (SDHC support, max. 32 GB)
Tacho pulse input, General purpose input	
Number of channels	1, BNC connector
Tacho pulse	
Input voltage range	0 - 12 V, open collector supported, internal pull-up 3.3 V (pull-up resistance 1 kΩ)
H-L threshold level	2.5 V
Measurement rotation speed range	5 000 pulse/s
General purpose	
A/D converter	10 bit successive approximation type
Sampling frequency	Approx. 10 Hz
External trigger	Open collector supported, internal pull-up 3.3 V
Power supply	Li-Ion battery (battery life approx. 4 hours, depending on usage conditions), AC adapter

Dimensions, Weight	40 (H) x 275 (W) x 188 (D) mm SA-A1: 1 200 g (incl. 280 g battery, SA-A1B4 mounted)
Water-resistant rating	Equivalent to IP54
Operating temperature range	-10 °C to +50 °C using AC adapter, max. 90 % RH (no condensation)
Supplied accessories	Rechargeable Li-Ion battery, BP-30 x 1, AC adapter NE-20P x 1, SA-A1 file converter, AS-70 Viewer

Ordering Information

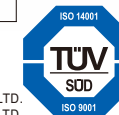
Product name	Product number
RIONOTE 2 channel FFT Analyzer	SA-A1FTB2
RIONOTE 4 channel FFT Analyzer	SA-A1FTB4
RIONOTE 2 channel Octave Analyzer	SA-A1RTB2
RIONOTE 4 channel Octave Analyzer	SA-A1RTB4
RIONOTE 2 channel Frequency Analyzer (FFT and Octave)	SA-A1FTRTB2
RIONOTE 4 channel Frequency Analyzer (FFT and Octave)	SA-A1FTRTB4
RIONOTE Program for FFT Analysis	SX-A1FT
RIONOTE Program for 1/3 Octave Analysis	SX-A1RT
Judgement Program (Pass/Fail Evaluation)	SX-A1CMP
Vibration Analysis Program	SX-A1VA
Order Tracking Program	CAT-SAA1-ORDTRK

Options

Product name	Product number
Lithium-ion Rechargeable Battery (spare)	BP-30
32 GB SD Card	MC-32SP3
2 GB SD Card	MC-20SD2
Voice Memo Microphone	BSHSM03BK
Monitor Earphone	ATH-C320-BK
Shoulder Belt	VA-12015
Carrying Case	SAA10660
LCD Protector	59SA5000
RIONOTE Desktop Stand	SA-A1S36
CCLD 4 mA Modification (factory option)	For SA-A1B2
CCLD 4 mA Modification (factory option)	For SA-A1B4



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Distributed by:



3-20-41, Higashimotomachi, Kokubunji, Tokyo 185-8533, Japan
Tel: +81-42-359-7888 Fax: +81-42-359-7442