
Multi-function Measuring System Platform SA-A1
RIONOTE
RION

# 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

＊Requires CCLD 4 mA modification of amplifier

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

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

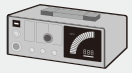
BNC Adapter
VP-52C

Accelerometer
(Triaxial type)
PV-97C*/93*

＊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

Voice memo input connector

Monitor output connector

I/O

Lithium-ion rechargeable battery
BP-30 (Supplied)

AC adapter
NE-20P
(Supplied)

LAN

USB (Mini B)

USB (Type A)

Option
SD card
(Max. 32 GB)

**RIONOTE**

Option **RT** **Octave band analysis**

Option **FT** **FFT analysis**

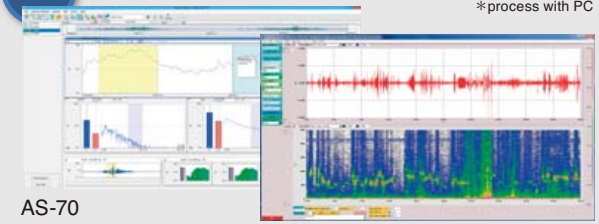
Pre-installed **WR** **Waveform recording**

Supplied **File converter**

**Excel file**

Option **Waveform Analysis Software**

＊process with PC



AS-70

CAT-WAVE

# 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 | $\pm\frac{N}{2}$ (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 overall |
| | 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

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# RIONOTE Program for Waveform Recording
## SX-A1WR

Pre-installed in RIONOTE

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 |

## 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.

### 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

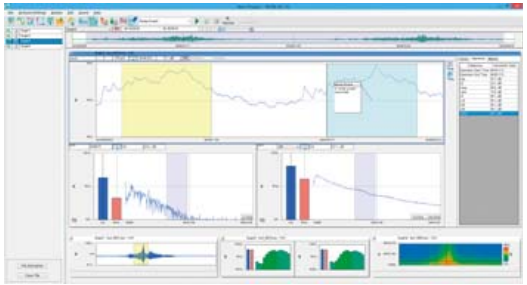
**2 GB SD card Sampling frequency: x2.56 (2.4 also supported), Quantization: 16 bit**

- 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

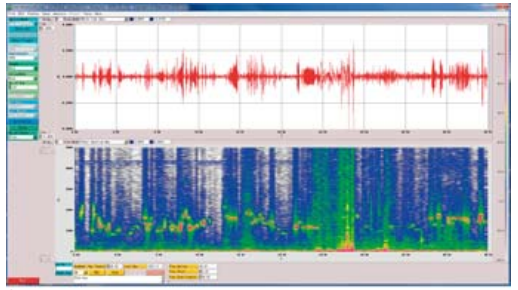


Waveform analysis screen example

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)<br>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

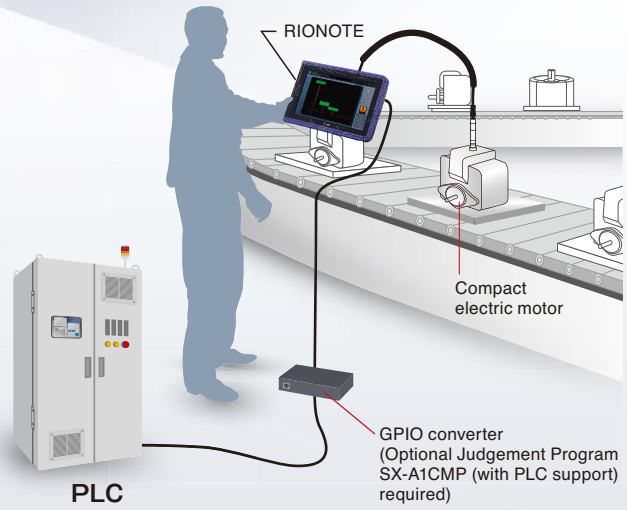
| | | |
|---|---|---|
| Waveform | | |
| | Display | Scaled time axis, Differential and integral calculus available |
| FFT analysis | | |
| | Sampling points | 64 to 32 768 points |
| | Display function | Power spectrum, Cross spectrum, Transfer function, Coherence, Power spectrum map, Octave map, Differential 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),<br>1/3 octave band 0.4 Hz to 10 kHz (45 bands),<br>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

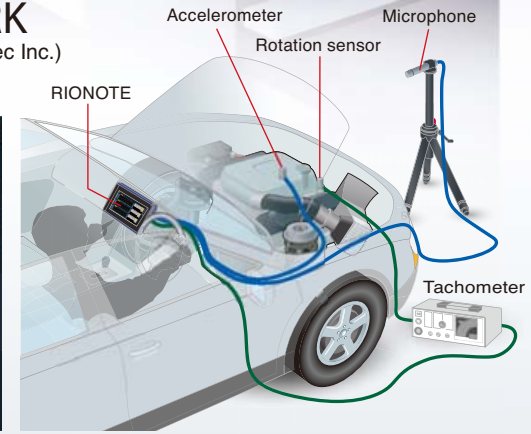
Adds vibration measurement functions.
All essential vibration measurement functions are provided, enabling equipment diagnosis and trend management for industrial machinery.
The program also supports detailed diagnosis including FFT analysis and envelope processing.

Specifications

| | |
|---|---|
| Vibration frequency range (using PV-57I) | Acceleration: 0.02 to 141.4 m/s² (rms)<br>Velocity: 0.2 to 141.4 mm/s (rms, at 159.15 Hz)<br>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, 1600, 3200 |

# Order Tracking Program
# CAT-SAA1-ORDTRK

(This software is a product of Catec Inc.)



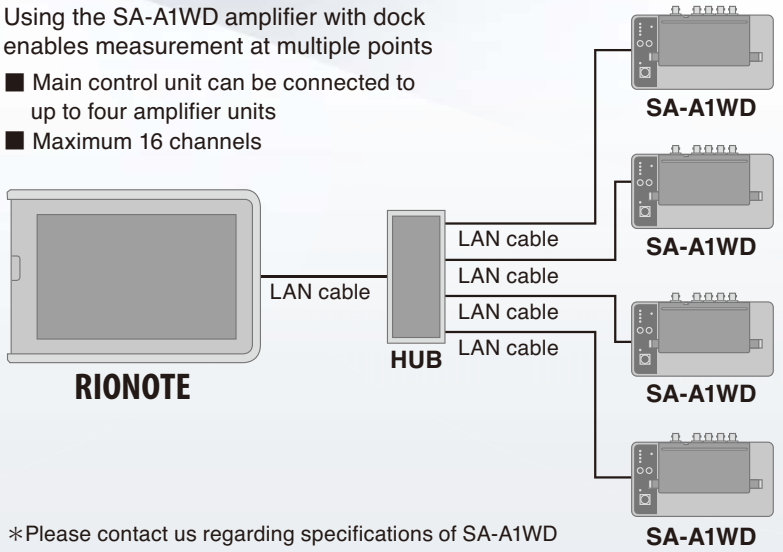

RIONOTE can simultaneously record rotational speed (rpm) data along with sound and vibration waveform data and perform automatic order tracking analysis based on these data.

- Number of channels: SA-A1B4: 3 channels, SA-A1B2: 1 channel ＊One channel is required for tacho 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

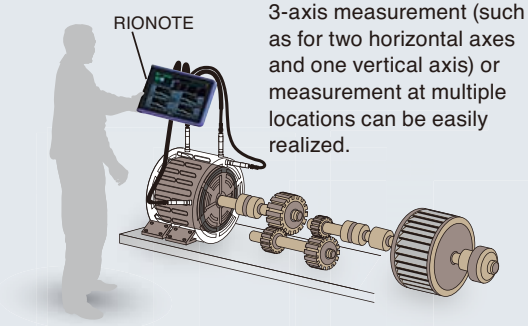



＊Please contact us regarding specifications of SA-A1WD

## Application Examples

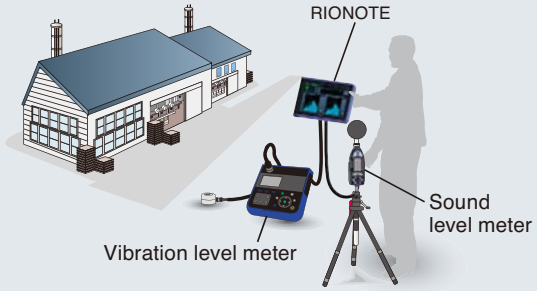
### Machine vibration measurement system

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.



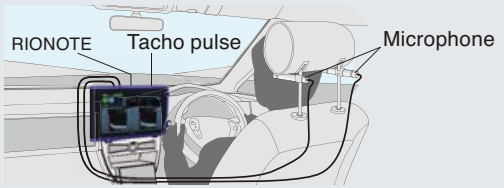

### Measurement and analysis of sound level and vibration level

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 tacho 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 tacho pulse input can be used in conjunction with such a setup.




RION

WATER RESISTANT

CE

**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 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 | | 10.1 inch TFT color LCD, 1 280 x 800 pixels, transmissive type |
| | 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, $\phi$3.5 |
| | 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<br>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<br>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,<br>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 | Use Rion fully guaranteed products. |
| 2 GB SD Card | |
| 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 |

ilac-MRA IA Japan JCSS JCSS 0197

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