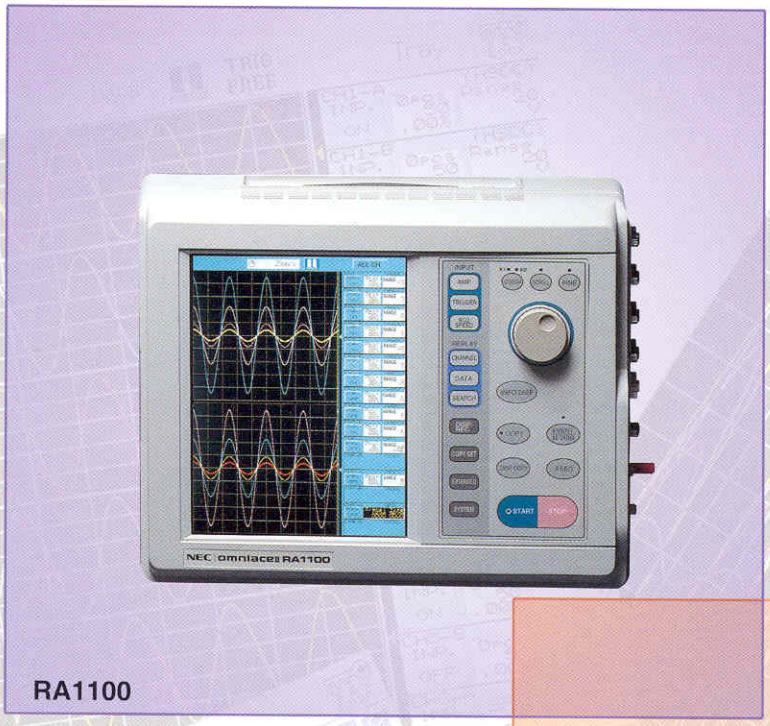
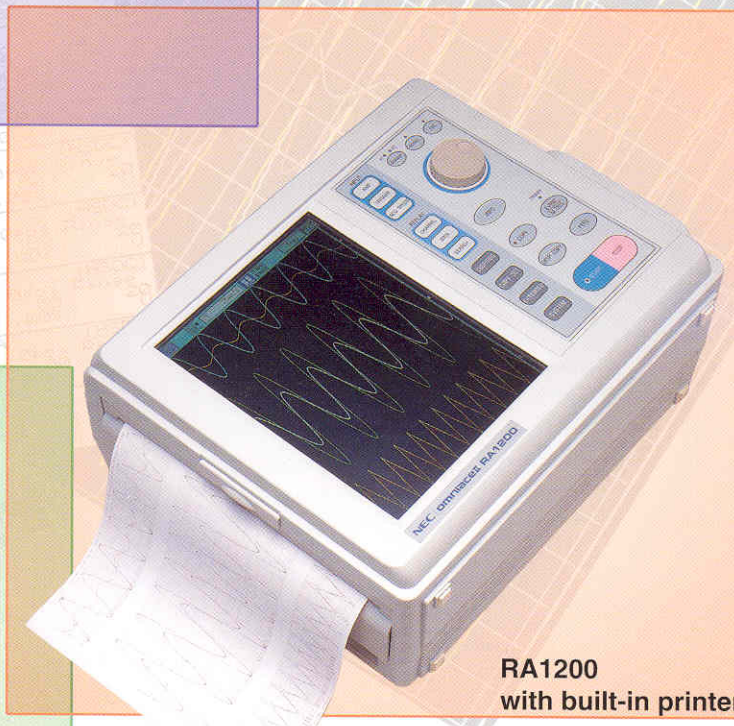
DATA ACQUISITION SYSTEM

omniace Ⅱ
RA1100/RA1200/RA1300

NEC
NEC San-ei



RA1100



RA1200
with built-in printer

RA1300
with high density & high speed built-in printer

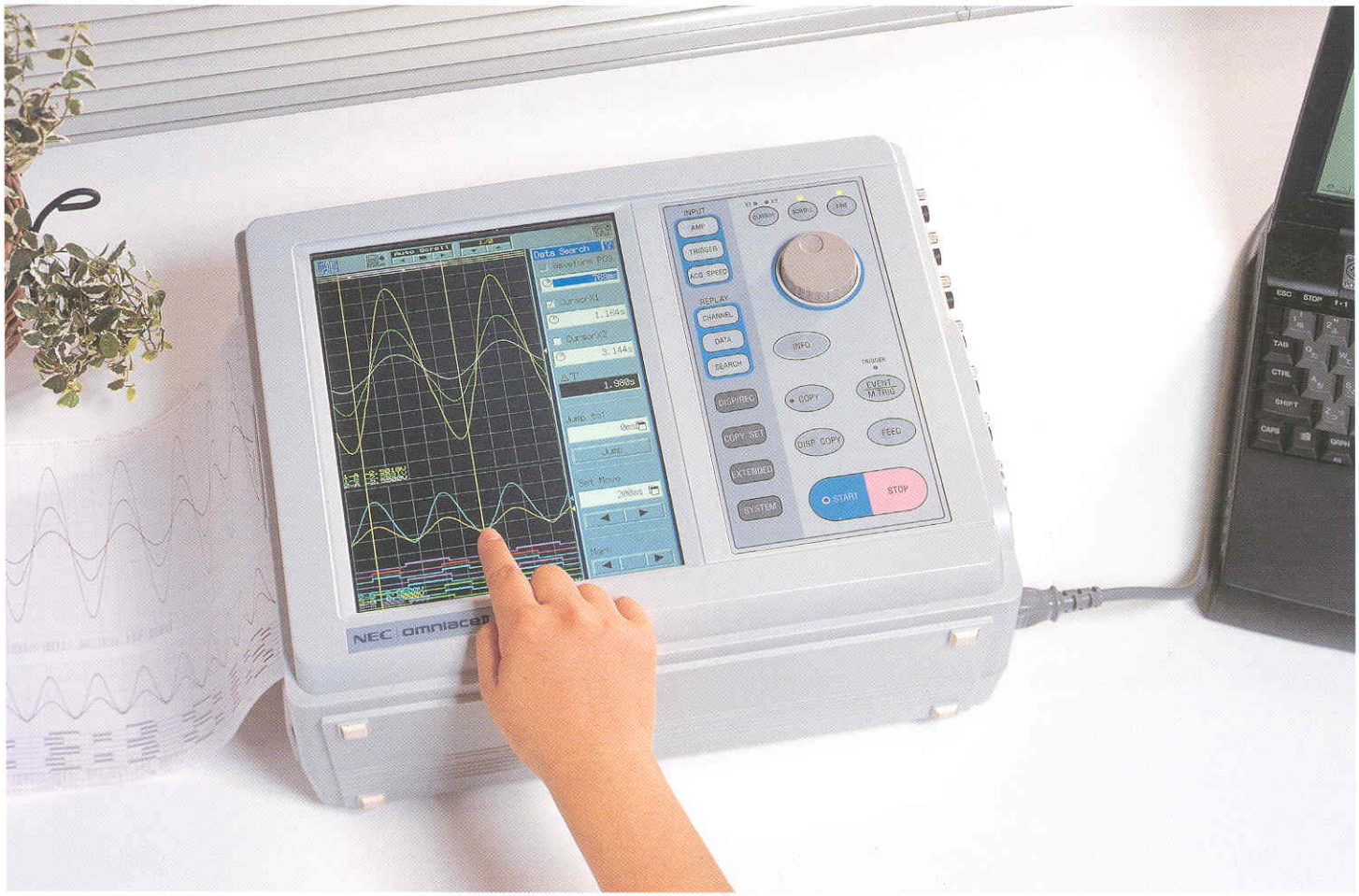
ISO14001
JQA-EM0260

ISO9001
JQA-1598

Omniace Has Envolved!

Now Featuring Improved Portability And Up To 16 Channels.

The RA1000 Series is data acquisition equipment consisting of a recorder with enhanced functions in data display, acquisition, and analysis. The RA1000's features, including easy operation and a color LCD, enable users to record data with high reliability. Moreover, the RA1000 Series features an all-in-one function that can perform data acquisition to analysis via optional FFT analysis, arithmetic operation, and waveform judgment functions. To increase the channel number, we have developed a dual amp (two channels per unit), which enables the realization of a multi-channel recorder with high portability. This feature provides space-saving advantages such as when installing in confined spaces or in vehicles.



FEATURES

● Affordable price

We offer the main unit with basic functions at affordable price and make various optional functions to be added on demand.

● Necessary functions can be selected.

Extended functions (arithmetic operations, FFT analysis, and waveform judgement) and interfaces (RS-232C, GP-IB, and SCSI) are provided as optional functions. You can select the functions according to the measurement conditions.

● Multi-channel support

16-channel measurement is enabled in this compact unit by the newly developed dual-amp (2 chs./unit).

● Variety of input units

16-bit high-resolution amps, which support the input of voltage, vibration, strain, and rotation pulses, are provided. In addition a 1μs (1MS/s) sampling speed is available by using a 12-bit high-speed DC amp. Replacement of input units is easier since they feature a plug-in design.

● High-speed chart feed

The real-time printing function, which is one of the basic functions of the recorder, features a performance of up to 100 mm/s (RA1300). For data backup, simultaneous data filing is also available.

●Color LCD display and easier operation

The 10.4-inch TFT color LCD display and touch panel support easier operation. Setup conditions can be changed by simply touching the screen.

● Long-time data filing

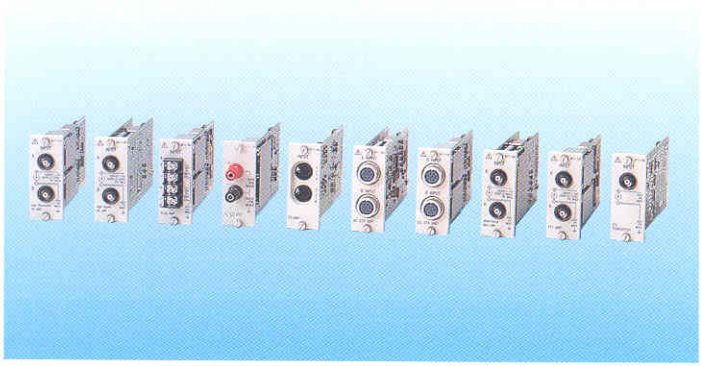
Long-time data acquisition (filing) is possible at a sampling speed of 200 s by storing data in the optional built-in MO (640 Mbytes) or PC card. Since the recorded data is in a digital format, data analysis after recording and long-term data management, which were impossible with chart data, can be performed.

● FAX transmission function increases measurement efficiency.

Automatic data transmission to a fax machine during data acquisition is possible by connecting the recorder to a modem.

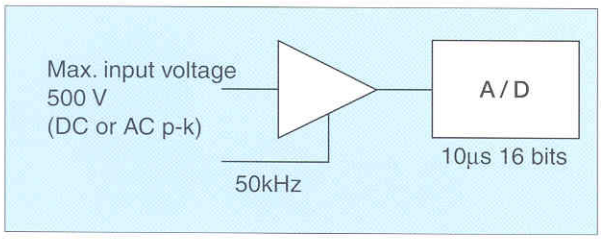
Variety Of Input Units

Selection of input unit according to measurement target



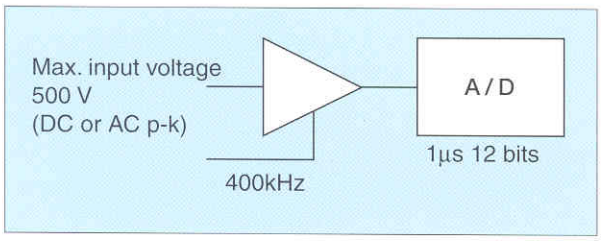
2-ch high-resolution amp (AP11-101)

This is a DC amp that can record at a high resolution of 16 bits. Channels are isolated from each other and have a withstand voltage for input of 500 V max. (DC or AC peak values). This amp contains two channels per unit.



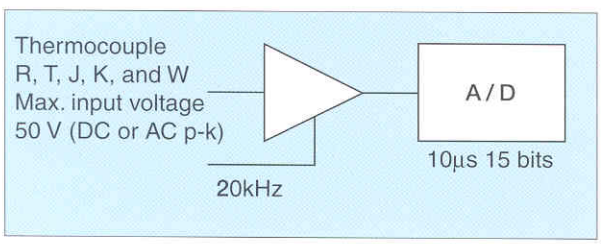
2-ch high-speed DC amp (AP11-103)

This is a DC amp that can acquire data at a high-speed sampling rate of 1 µs. Channels are isolated from each other and have a withstand voltage for input of 500 V max. (DC or AC peak values). This amp contains two channels per unit.



2-ch TC/DC amp (AP11-106)

This amp can be used as a thermocouple amp or DC amp. When temperature measurement using a thermocouple amp and voltage measurement using a DC amp are necessary, this amp is useful because no amp replacement is required. Moreover, five types of thermocouples, R, T, J, K, and W can be connected and high-speed temperature measurement as fast as 10 µs is possible. Channels are isolated from each other and have an input voltage of 50 V max. (DC or AC peak values). This amp contains two channels per unit.



TC/DC amp (AP11-107)

This amp can be used as a thermocouple amp or DC amp. When temperature measurement using a thermocouple amp and voltage measurement using a DC amp are necessary, this amp is useful because no amp replacement is required. Moreover, four types of thermocouples, R, T, J, and K, can be connected and high-speed temperature measurement as fast as 10 µs is possible. This amp contains one channel per unit.

Event amp (AP11-105)

This amp is a logic amplifier that can input eight channels of voltage or contact signals. It is useful for measuring timing or contact signals.
Voltage input: Input voltage 0 to 24 V
H level: 2.5 V or higher
L level: 0.5 V or lower
Contact input:
Open: 2 kΩ or higher
Short: 250 Ω or lower

2-ch AC strain amp (AP11-104)

This amp is a 2-channel amplifier that inputs signals from strain gauges or strain gauge based sensors. Due to the AC bridge type, it features high noise resistance (against the noise caused by the line voltage), high stability, and a high resolution of 16 bits. Low-noise measurement is possible for measurement using strain gauges, which do not have any shielded wires.
Auto-balance
Bridge voltage: 5 kHz, 2 V rms
Response frequency: 0 to 2 kHz
Gauge factor adjustment function: 1.9 to 2.2

2-ch DC strain amp (AP11-110)

This amp is a 2-channel amplifier that inputs signals from strain gauges or strain gauge based sensors. Due to the DC bridge type, it features measurement of high-speed strain signals at a high resolution of 16 bits.
Auto-balance
Bridge voltage: 2 VDC, 5 VDC
Response frequency: 0 to 50 kHz

2-ch vibration/RMS amp (AP11-109)

This is a 2-channel amplifier that features a constant-current power supply for amp-embedded sensors, an RMS conversion function, and a band-pass filter.
The RMS function in this amp is effective for monitoring the basic frequency level fluctuation in rotation equipment and the fluctuation of the AC power level.
For vibration measurement, an amp-embedded charge sensor can be directly connected to this amp unit. For voltage measurement, 500 V (DC or AC peak values) can be directly input. In addition, the band-pass filter offers filtering of necessary frequencies to perform the RMS conversion so that clear waveforms for judgment are available.
Power for sensor: 2 mA/18 V or higher
Voltage measurement range: 100 mV to 500 V
Band-pass filter: -24 dB/oct
A/D: 16 bits

2-ch FFT amp (AP11-102)

This is a 2-channel amplifier that incorporates an anti-aliasing filter required for the FFT processing and the power for an amp-embedded sensor (constant current). The anti-aliasing filter has a dropout feature at -72 dB/1.5 fc so that the aliasing generated in FFT can be eliminated.
Power for sensor: 2 mA/18 V or higher
Voltage measurement range: 100 mV to 500 V
A/D: 16 bits
Fmax: 40 kHz

F/V converter (AP11-108)

This unit offers frequency-to-voltage conversion, which is useful in recording rotation changes and revolutions in rotation equipment.
Input frequency: 10 kHz max.
Response time: 20 ms (Range of 10 kHz)

Input unit selection block dialog

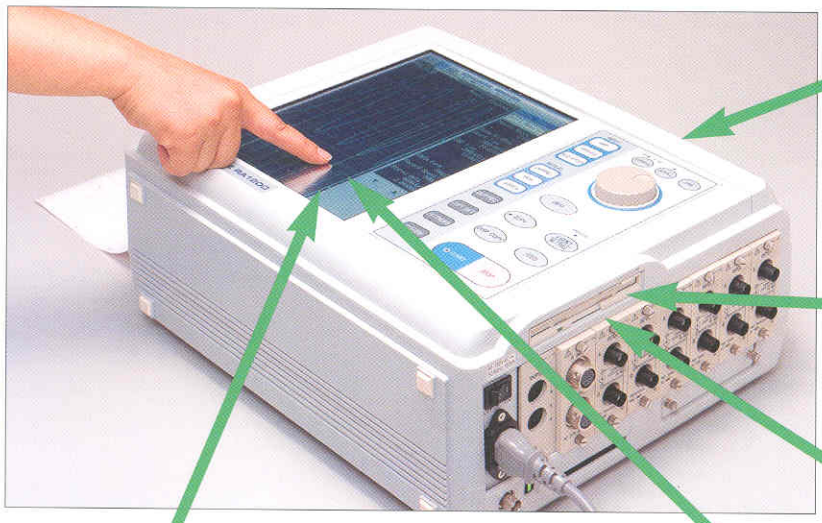
Input signal	Probes and cables
Voltage ±500V (DC or ACpk)	Isolated BNC cable (0311-5175)  BNC-Safety Jacks adapter (0243-3021) 
Current High current	Clamp meter 2003A 2000/400 A DC and 40 to 1 kHz  8005 600/100 A DC to 400 Hz 
Medium current	Clamp meter 8113  200/20/2A DC to 1 kHz
Low current	Clamp meter 8112  20/2/0.2A DC and 30 to 10 kHz
Voltage fluctuation 10% and 20% 100-V type 200-V type	This unit detects voltage fluctuations of power line. 10% and 20% of 100 VAC or 120 VAC lines can be detected.  0/1543
Voltage detection 50 VAC to 250 VAC 20 VAC to 250 VAC	This unit detects whether the DC or AC voltage is applied or not. It supports four channels. (Each channel is isolated.)  1539
Temperature Thermocouple R, T, J, K, and W* * W can only be used in AP11-106	Thermocouple with cover and sheathed thermocouple

Input signal	Sensor
Vibration (impact acceleration)	Amp-embedded charge accelerometer  9F21Z 9F22Z 9F23Z 9F24Z
	Charge accelerometer (SV, 9F, 9G, etc.)  Charge converter This unit is necessary when charge accelerometers are used.  AP11-901 AP11-903 AP11-902
Strain, load, displacement, acceleration, and torque	Strain gauge  Bridge box 
	Strain gauge sensors Load cell, pressure transducer, displacement transducer, accelerometer, torque transducer, and slip ring. 

Input signal	Probes and cables
Logic Voltage input: 0 to +24 V H: 2.5 V or higher L: 0.5 V or lower Contact input Open: 2 kΩ or higher Short: 250 kΩ or lower	 Alligator clip cord (0311-5009) IC clip cord (0311-5008)  Logic IC cable (0311-5007)
Rotation signal Voltage input 0.3 V to 30 V p-p 1 Hz to 10 kHz Rotation pulse	Isolated BNC cable (0311-5175)  BNC-Safty Jacks adapter (0243-3021) 

Input units	
2-ch high-resolution DC amp AP11-101 A/D: 16 bits 100 ks/s (10µs) 100 mV to 500 V	
2-ch high-speed DC amp AP11-103 A/D: 12 bits 1 Ms/s (1µs) 100 mV to 500 V	
2-ch TC/DC amp AP11-106 A/D: 15 bits 100 ks/s (10µs) R, T, J, K, and W 100 mV to 50 V	
TC/DC amp AP11-107 A/D: 14 bits 100 ks/s (10µs) R, T, J, and K 10 mV to 50 V	
2-ch FFT amp AP11-102 A/D: 16 bits 100 ks/s (10µs) With power supply for a sensor and anti-aliasing filter 100 mV to 500 V	
2-ch Vibration/RMS amp AP11-104 A/D: 16 bits 100 ks/s (10µs) With power supply for a sensor 100 mV to 500 V With band-pass filter	
2-ch AC strain amp AP11-104 A/D: 16 bits Bridge power: 5 kHz (sine wave) Frequency response: 2 kHz Auto-balance 1 k to 20 kµε	
2-ch DC strain amp AP11-110 A/D: 16 bits Bridge power: 2 VDC and 5 VDC Frequency response: 50 kHz 800 to 2kµε (at BV=5V) 2 k to 50 kµε (at BV = 2 V)	
Event amp AP11-105 Input: 8 logic inputs Voltage or contact	
F/V converter AP11-108 A/D: 12 bits 0.3 V to 30 Vp-p 1 Hz to 10 kHz	

Easier Operation



Selectable functions

In order to maintain a reasonable price, we offer a variety of functions and interfaces as optional functions.
Since extensions can be installed via floppy disk or plug-in interfaces, upgrades are available after purchase

Start-up function

Preset measurement conditions can be automatically loaded using the startup floppy disk at power-up.

Optional functions

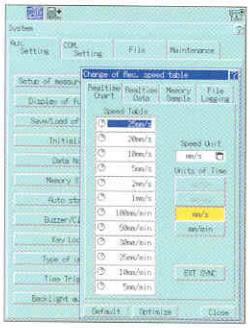
Optional functions such as Arithmetic operation, FFT, Waveform judgement and Input sensitivity DIV setting can be installed using the optional floppy disks.

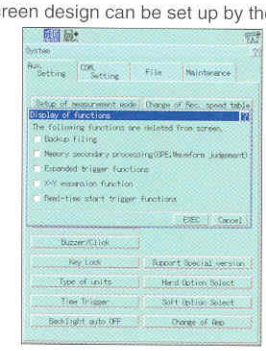
Easier operation

The 10.4-inch TFT color LCD, touch panel, and Japanese character support offer easier operation. Setup conditions can be changed by simply touching the screen while data waveforms are being monitored.
The waveform position, trigger level, and cursor can be changed by simply touching the screen.

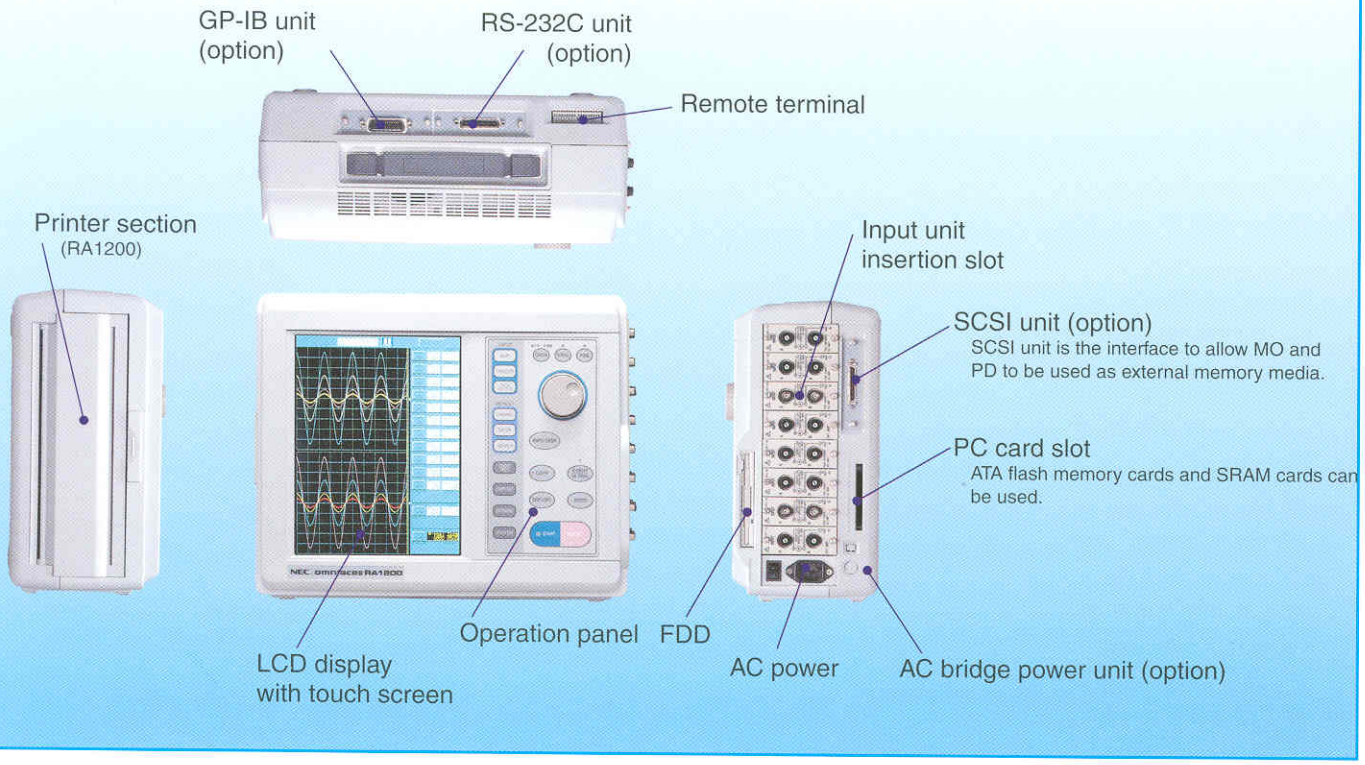
User-set screen

The screen design can be set up by the user.





Users can create the items they need.



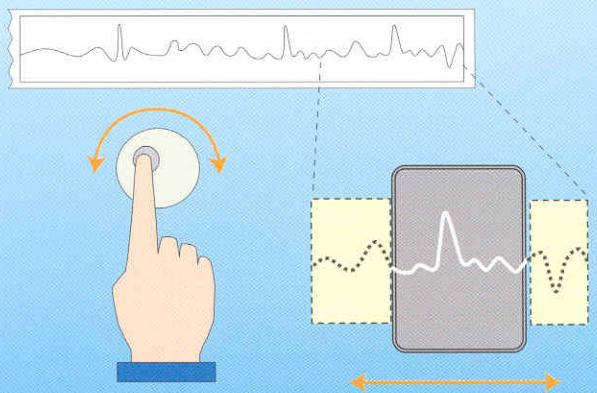
Monitoring

Input monitoring

Real-time input signal monitoring, in the form of a waveform or numerical value, is available.
Changes of input, acquisition, and display conditions during input signal monitoring is possible.

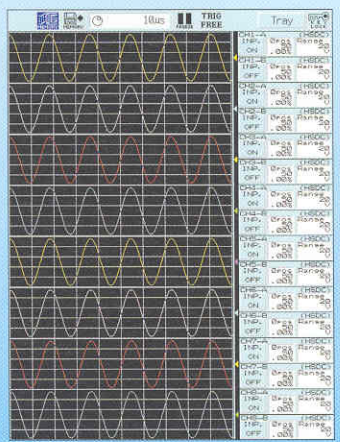
Playback function (Effective in real-time mode)

Like with memory data, the waveform data appearing on the screen can be replayed, printed, and saved, even after monitoring stops.
Signal monitoring without printing on recording paper is possible since only the necessary portion is output, which can save recording paper.



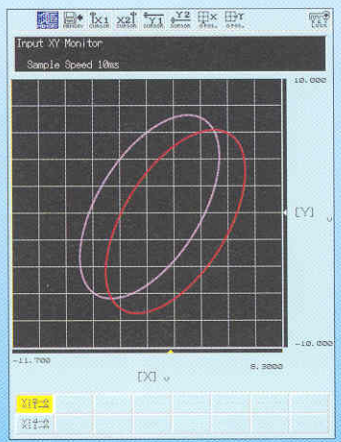
Search and display the portion you need by using the jog-dial and scroll key.

Monitor during amp setup



You can set the amp while observing signals.

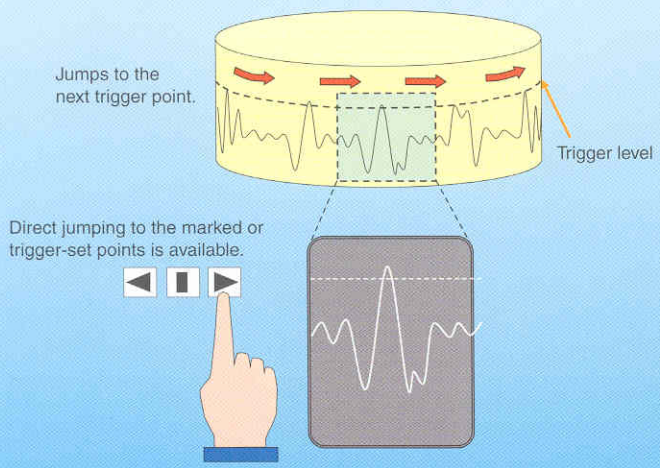
X-Y monitor



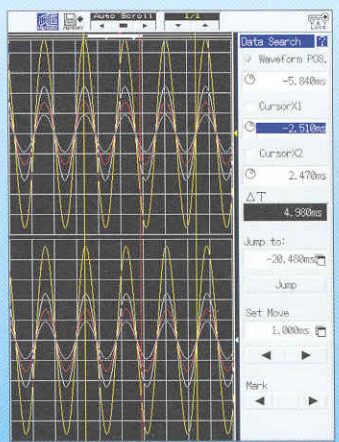
X-Y graph representation is available by setting arbitrary channels to X and Y.

Replay monitor offering quick data search

Waveform replay is available for memory data and filing data (for both real-time mode and memory mode). By selecting an area for the data, data can be output to recording paper, file, or fax machine.
By marking or putting a trigger setting on data, direct jumping to the marked or trigger-set points is possible.
Moreover, the data can be searched by time and date, which enables easy data display.

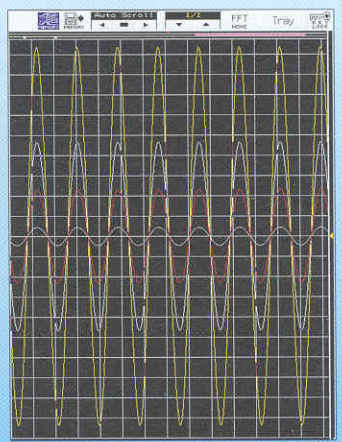


Cursor data display



Numerical data at a cursor and the time difference between cursors can be displayed.

Full-screen display

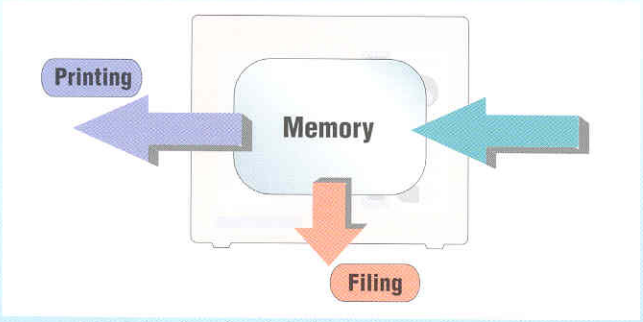


All channels are displayed in full-screen size.

Recording

Recording quickly-changing signals [Memory mode]

In the memory mode, you can record a high-speed physical phenomenon in an embedded 256-kW/ch memory at a sampling speed of between 1 µs and 1 s. The recorded data can be displayed on the screen, printed on chart paper (RA1200 and RA1300), filed in a recording medium, or transmitted to a fax machine.



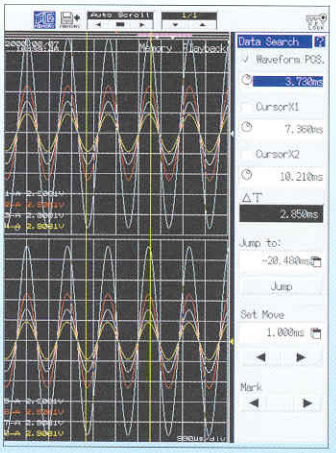
The monitored waveform is displayed in the same format as the recorded data.

● **Memory**

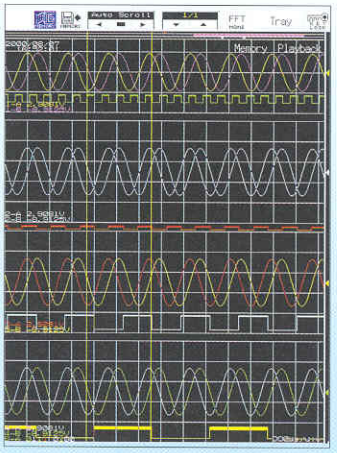
The memory capacity per channel (standard capacity: 256 KW/CH) can be expanded up to 2 MW/CH depending on the number of channels. The memory in unused channels is effectively utilized. Memory can be divided by up to 128 blocks, thus enabling continuous recording numerous times.

Sampling	Time axis	Standard memory (256 KW/CH)	Expanded memory (1 M/CH)
1µs	100µs/DIV	0.262s	1.04s
2µs	200µs/DIV	0.524s	2.09s
5µs	500µs/DIV	1.31s	5.24s
10µs	1ms/DIV	2.62s	10.4s
20µs	2ms/DIV	5.24s	20.9s
50µs	5ms/DIV	13.1s	52.4s
100µs	10ms/DIV	26.2s	1m44s
200µs	20ms/DIV	52.4s	3m29s
500µs	50ms/DIV	2m11s	6m59s
1ms	0.1s/DIV	4m22s	17m28s
2ms	0.2s/DIV	8m44s	34m57s
5ms	0.5s/DIV	21m50s	1h09m54s
10ms	1s/DIV	43m41s	2h54m45s
20ms	2s/DIV	1h27m22s	5h49m31s
50ms	5s/DIV	3h38m27s	11h39m03s
100ms	10s/DIV	7h16m54s	1day05h07m37s
200ms	20s/DIV	14h33m48s	2day10h15m15s
500ms	50s/DIV	1day12h24m32s	4day20h30m30s
1s	100s/DIV	3day00h49m04s	12day03h16m16s

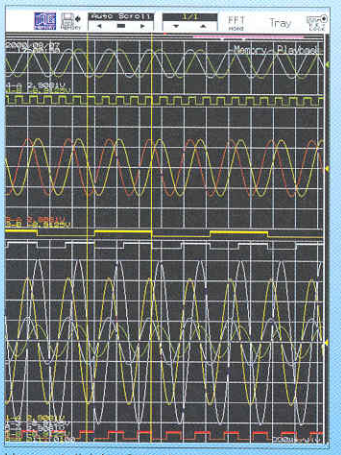
● **Excellent display and printing functions**



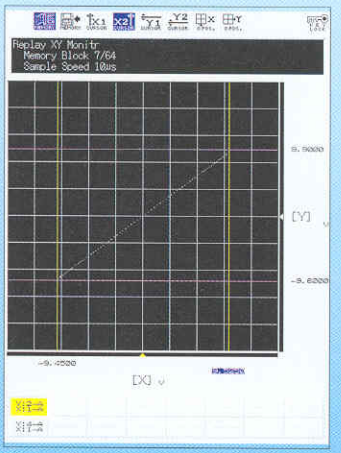
Readings at cursors appear during input monitoring.



Positions and amplitudes for event signals can be changed.



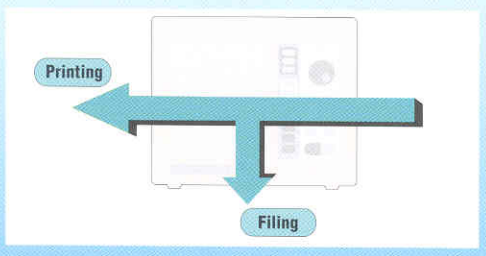
User-set division format
The waveform display format can be freely set to 1/1, 1/2, 1/4, 1/8, and 1/16 as well as other values.



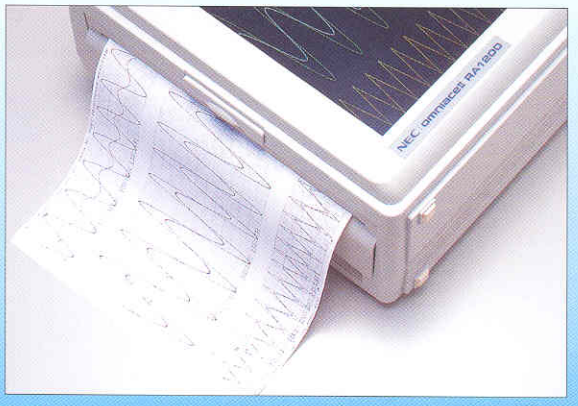
X-Y monitor
X-Y monitoring is available regardless of the measurement mode.

Printing input signals in real-time [Real-time mode: RA1200/RA1300]

The highest chart speed in real-time waveform printing is 25 mm/s and 100 mm/s in the RA1200 and RA1300, respectively. Three printing formats, waveform, X-Y, and numerical value are available. In addition, it is possible to perform data printing on recording paper concurrently with data monitoring on the display and filing in storage media.



The monitored waveform is displayed in the same format as the printing data.



● **Real-time trigger**

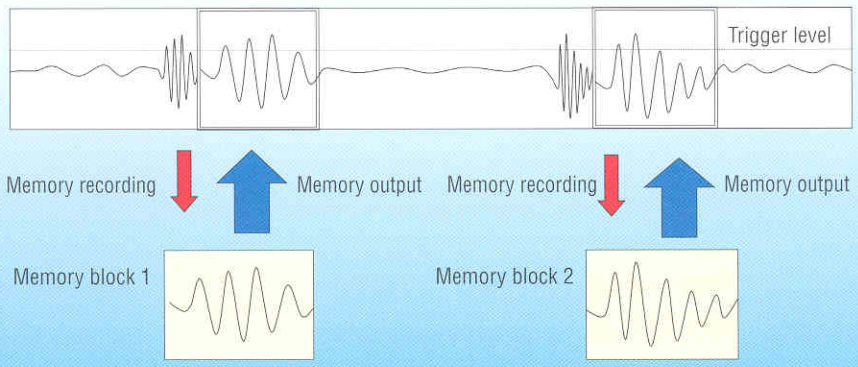
The real-time trigger permits triggered real-time printing and filing, thus allowing only necessary data to be saved.

Acquisition

Printing both regular signals and accidental signals [Transient mode]

The transient mode permits concurrent operation of the real-time and memory modes. The accidental signals can be saved during real-time printing.

● Transient printing
Acquisition in memory upon trigger detection during real-time recording is possible. Both "recording of regular signals" and "recording of accidental signals" are available.



Long-term data acquisition [Filing mode]

This mode features long-time data recording in a media at a sampling speed of between 200 s and 60 s (The highest speed differs depending on the number of channels and storage media used). The RA1200 and RA1300 can execute filing and print waveforms on the recording paper at the same time. Additionally, by setting the media to ring memory, it is possible to record only the latest data.

- Acquisition speed: 200 µs to 60 µs
- Paper feed speed: RA1200: 25 mm/s or slower
  RA1300: 100 mm/s or slower
  Waveform printing can be set independently of acquisition speed.
- Acquisition method: Normal/Ring
- Recording length: Normal: 10 data/ch to max. available capacity
  Ring: 1 M data/ch to max. available capacity

Max. filing acquisition time (in 640-Mbyte MO for 16 channels)

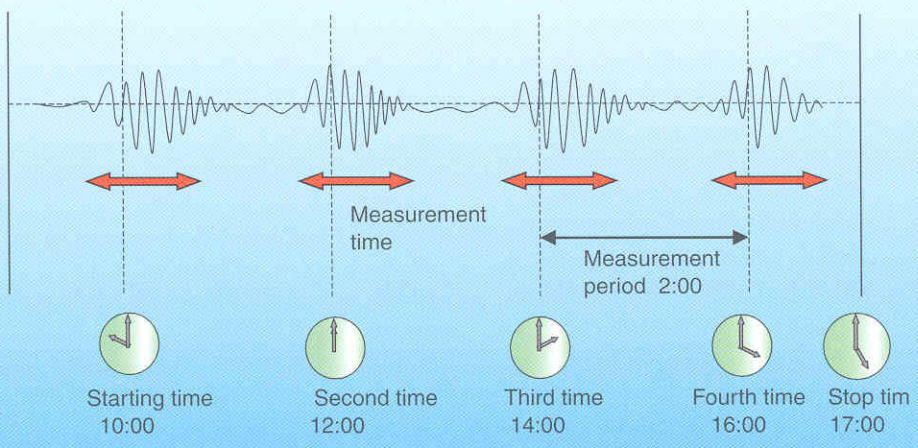
	200 µs sampling	100 ms sampling
Peak data	33 min.	11 days 29 hrs 24 min.
Sampling data	1 hour 6 min.	22 days 58 hrs. 48 min.

Trigger function

The RA1000 Series features a wealth of trigger functions.

- Trigger mode: OR, AND, WINDOW, A*B, external, manual, and time
- Pre-trigger: 0 to 100% (by 1% steps)
- Acquisition operation: Single, repeat, and endless
- Trigger filter: 1 to 65535 points
- Pass count trigger: 1 to 1000 times

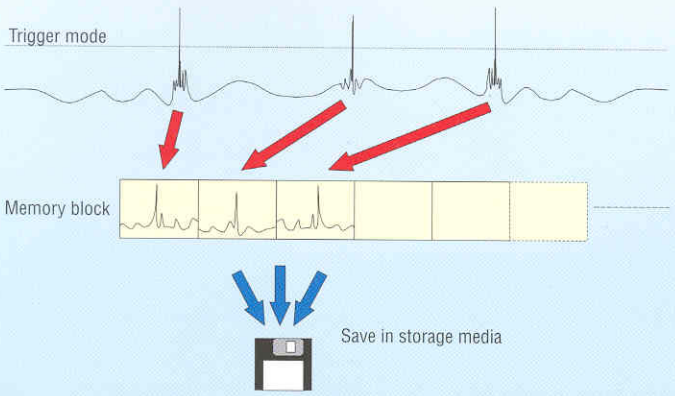
● Time trigger (by internal clock)
The time trigger offers automatic measurement at fixed times and time intervals, which is effective for periodic facility maintenance.



Filing function that maximizes the data acquisition performance

● **Memory filing (Auto save)**

In the memory mode, automatic or manual data save is available for the data acquired in the memory. The automatic save function allows repeated measurements until the storage media become full. Selective saving of replayed data in the storage media is also possible.



Data save in the text (CSV) format is available, thus offering direct readout via spreadsheet software without file conversion.

● **Backup filing**

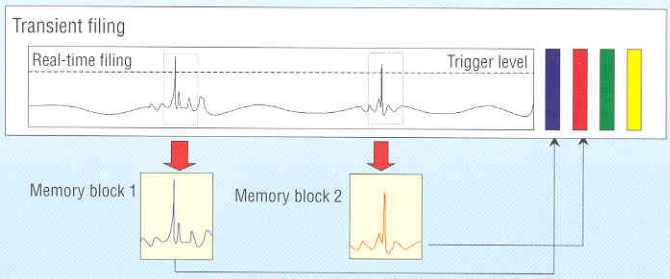
In the real-time mode, input signal acquisition has been realized whereby the recording paper can be saved and the acquired data can be used as data back-up. Long-term data acquisition is possible by using a 640-Mbyte MO.

Acquisition speed: RA1200: 25 mm/s or slower
RA1300: 100 mm/s or slower
Recording length: 10 data/ch to max. available capacity

Max. filing acquisition period (in 640-Mbyte MO for 16 channels)
11 hrs 1 min. at 25 mm/s (RA1200)
2 hrs 45 min. at 100 mm/s (RA1300)

● **Transient filing**

While real-time filing is being performed, memory acquisition can be executed upon trigger detection. Concurrent operation of "long-term regular signal data acquisition" and "accidental high-speed data acquisition" is possible.



After acquisition, the memory data is saved in the same folder as for real-time filing.
The maximum memory acquisition count is 128.

● **Peak data and sampling data (Example: 10 ms sampling)**

<Sampling data>
Data acquisition is performed based on the preset sampling speed.
The saved data, which is sampled at this sampling speed, represents real data.

<Peak data>
1 µs (1 MHz) sampling is performed in the range of the selected sampling speed. In this case, the maximum and minimum values are recorded.
A unique point of data (i.e. the peak value) can be acquired, thereby reducing the data volume.

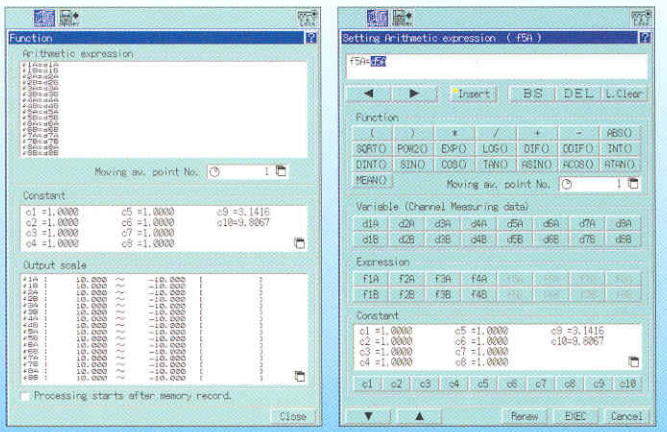
Data Processing

Arithmetic operation function (Optional)

Arithmetic operations can be performed for the data defined as a zone in the memory. The results can be displayed on the screen, printed out as a waveform, and saved in a file.
Automatic copying and filing of the operation result is possible.

● Statistics operation
Max, min, P to P value, average, area, RMS, standard deviation, rising time, and falling time

● Function operation
The four operations, absolute values, simple & quadratic differential, simple & quadratic integral, square root, exponential, common logarithm, moving average, and trigonometric function

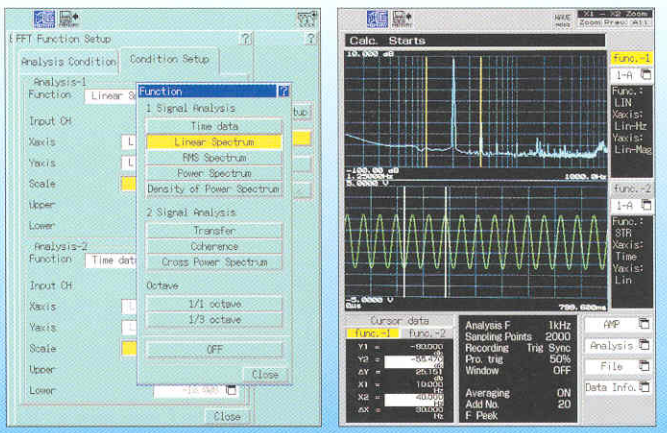


FFT analysis function (Optional)

Eight functions are provided.
There are two modes: one is to perform analysis on real-time data, another is on memory data or filed data.

• For one-signal input analysis
Linear spectrum, power spectrum, RMS spectrum, power spectrum density, and octave analysis

• For two-signal input analysis
Transfer function, cross power spectrum, and coherence function

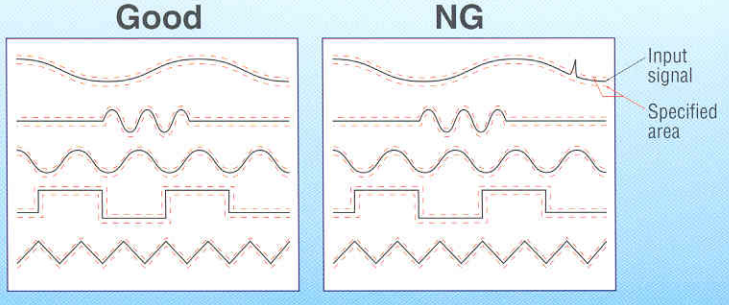


Waveform judgment function (optional)

In the memory mode, waveform judgment areas can be specified, so that it can be judged whether an input signal is within the specified area or not.
Waveform judgment areas can be specified for up to 16 channels.

Operation based on the judgment results → Good or NG

- Displaying on monitor
- Printing on recording paper
- Data saving in external memory media
- Outputting as remote signals

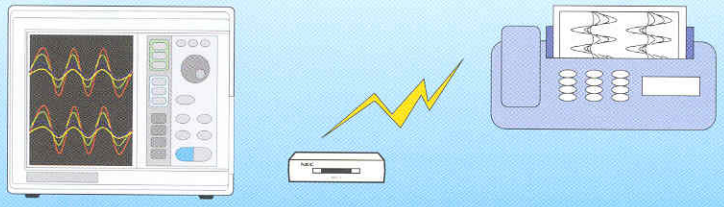


Communication Function

Communication function (Optional)

● **FAX function**

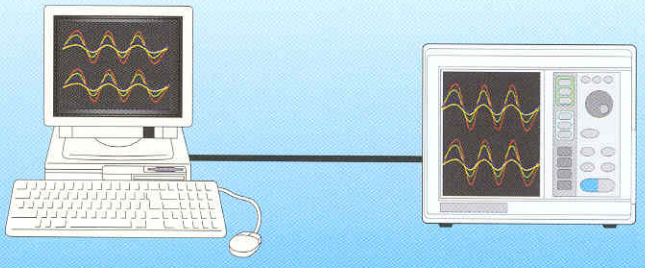
Waveform data can be transmitted as the same image as the memory copy via a fax machine. (in the memory mode or during data copy)
Operators can obtain measurement data at their office without having to be present at the measuring site.



* Available when the optional RS-232C unit is installed.

● **On-line communication function**

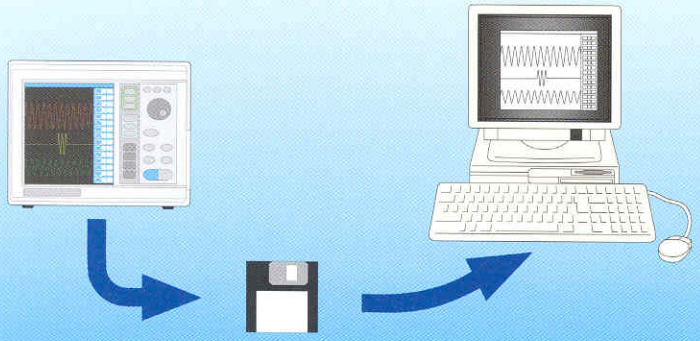
Control from a personal computer is available by installing the optional RS-232C or GP-IB unit.



Report Creation Function

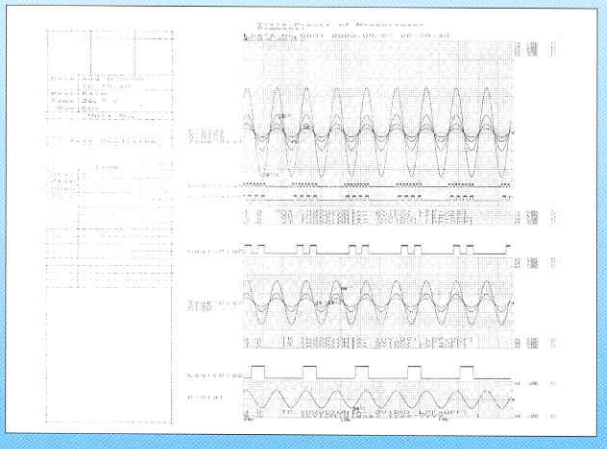
Screen image save

The screen image can be saved in a storage medium. Report creation is made more efficient by pasting the image on a word processor running on a personal computer.



Report creation function

After the data in the memory is defined as a zone, an A4-size report can be output. Text data written by a word processor in a personal computer can be imported to the Omniace II via a floppy disk, allowing waveform data to be printed with comments. Since measurement conditions and test information can be printed with waveform data, the printout itself can be used as the report.



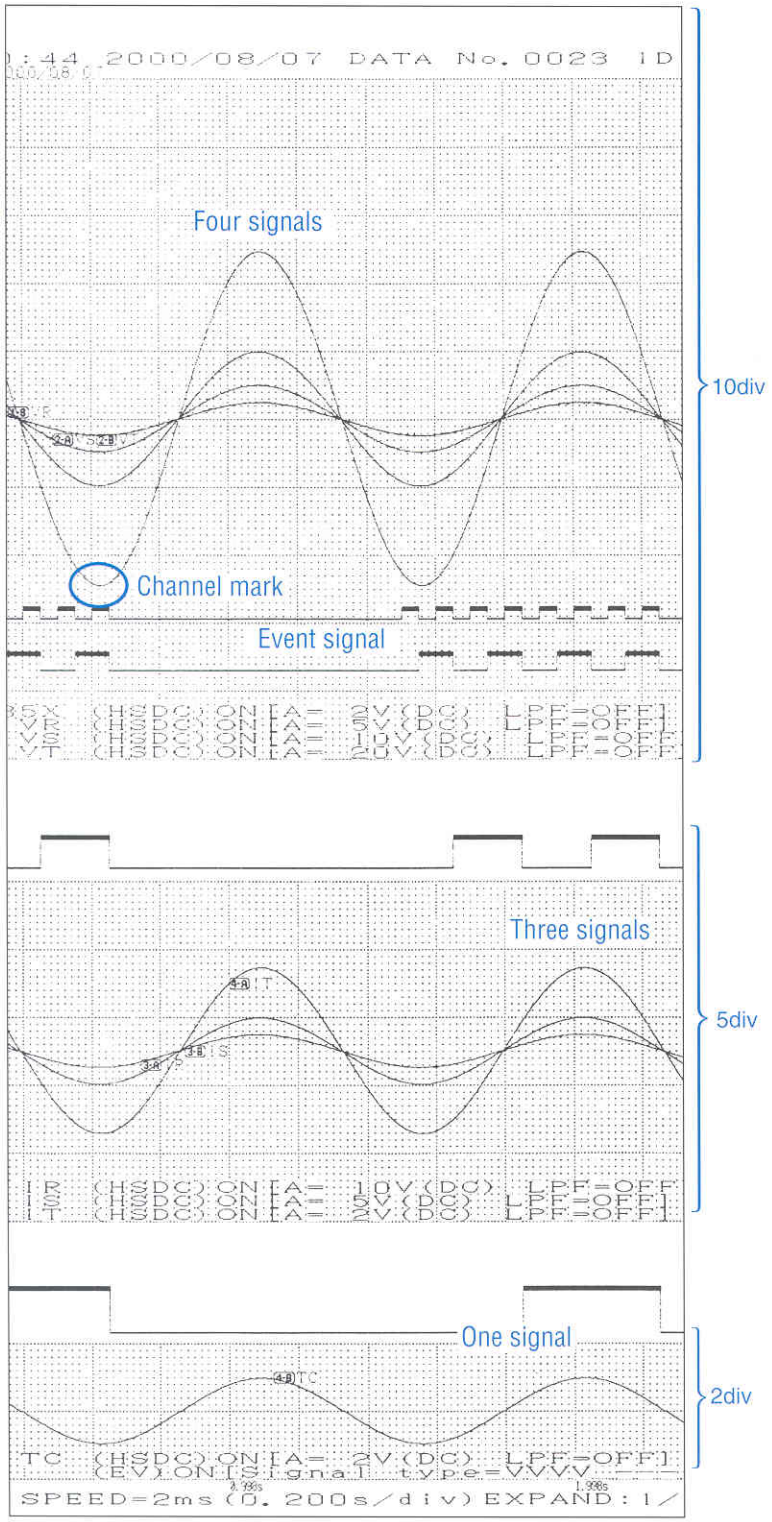
Printing

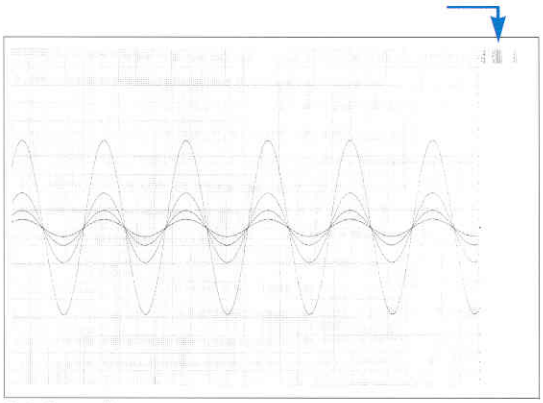
Example of printout

● **Flexible print layout of waveforms**

The following layout settings are available.

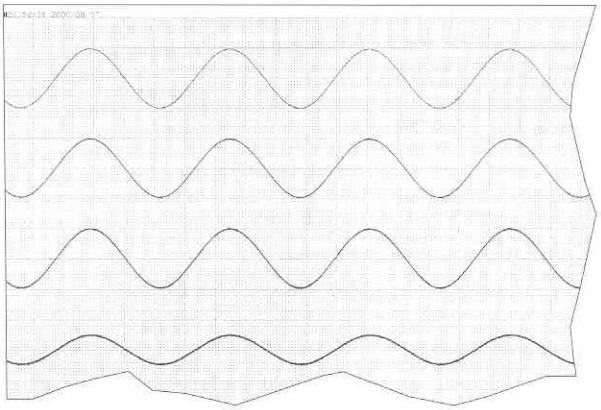
- Segments scales from 1 to 16.
- Change of the width from 1 to 20 divisions for each segmented printing area.
- Channel numbers printed in the segmented printing areas.
- Change of positions and amplitudes for event signals. (8 units max. in RA1100 and RA1200, 2 units max. in RA1300)
- Registration of up to four characters for the channel mark used to identify the channel.





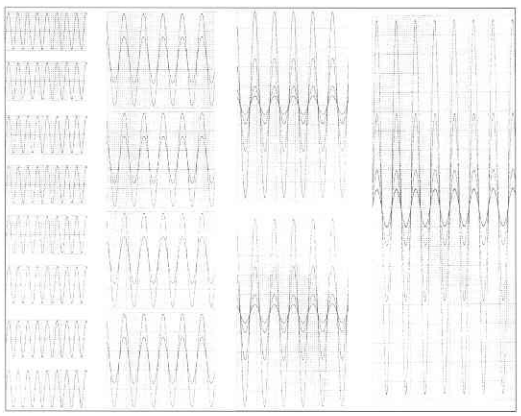
● **Auto-scaling**

Scale printing is available before or after the waveform printout.



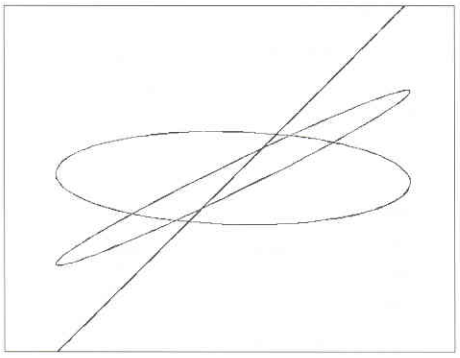
● **Change of printing line width**

The thickness of waveform line can be changed at four levels each channel.



● **Blank feed length**

The feed length (blank portion length) after waveform printing can be set from 0 to 100 mm.



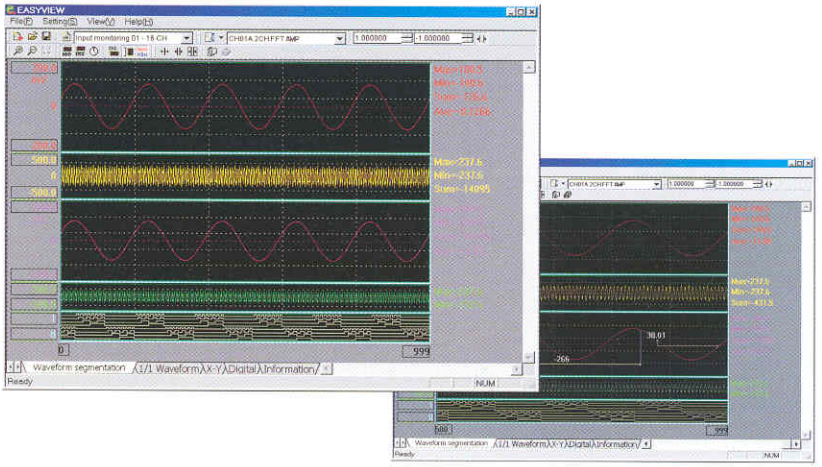
● **X-Y printing**

X-Y printing of size 200 mm x 200 mm is available by setting channels to the X and Y axes.

Measurement Support Software

OmniView NS1100

Computer Based Data Analyzing For Data Acquisition System



Features

1. Applicable to Windows95/98/NT

2. Easy Operation

- Operability being unconscious of complicated measuring instruments.
- Easy setting with a mouse operation.

3. Easy connection

- Connecting easily by a registration wizard.

4. Applicable to Network

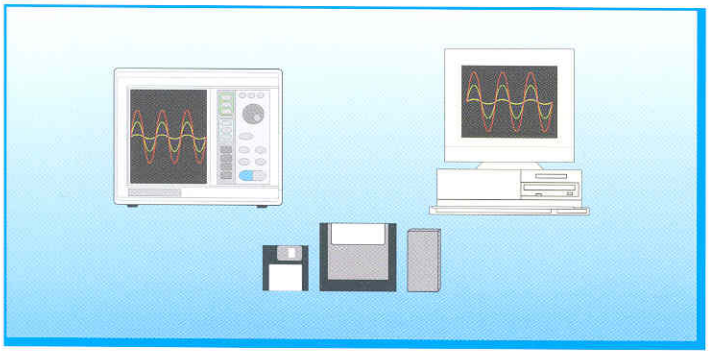
- Enable to monitor on a personal computer on the network.

OmniView NS1100 is operated under Windows95/98/NT and enables measuring data using a measuring instrument connected with GP-IB or RS-232C as a front-end.

It is easy to perform a measurement by setting the input unit, sampling speed and recording period and so on. Waveform display, numerical value display, X-Y display or four rules of arithmetic operation between channels is available during or after the measurement. Furthermore the measured data can be converted to text data to process by the third party's analyzing software on the market.

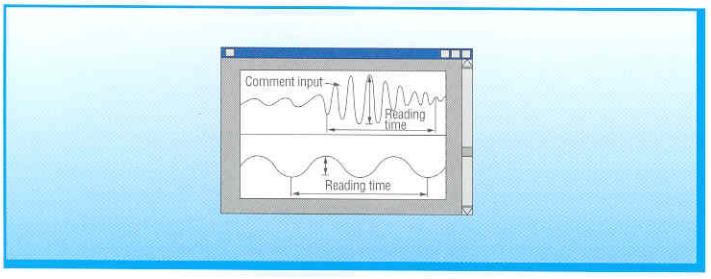
OmniView is a measurement support software to realize data acquisition and monitoring, those are measuring basics, easily.

Off-line Measurement

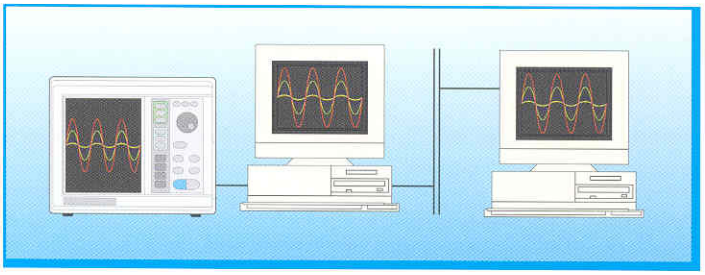


Data Acquisition

Arithmetic and Display



Networking

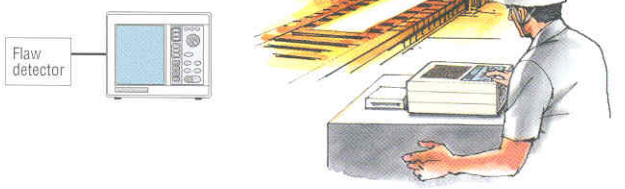


Function	◆ Recording condition and setting Sampling speed, recording period, recording frequency ◆ Input condition and setting Input sensitivity, filter, trigger condition, etc. ◆ Measuring data Division display, piling display, X-Y display, numerical value display, changing Y-axis width	◆ Waveform display Division display. piling display, X-Y display, numerical value display, changing of Y-axis width ◆ Figure detection function Max, min, max - min, difference between cursor, time difference between cursors, comment input	◆ Arithmetic operation The four rules of arithmetic operation between channels and with coefficient. ◆ File conversion Text file
Applicable model	RA1100 RA1200 RA1300		
Operation environment	CPU	MMX-Pentium 233Mhz or greater	
	Main memory	32Mbyte or more	
	Hard disk	50Mbyte vacant capacity or more	
	OS	Windows95/98/NT	

Applications

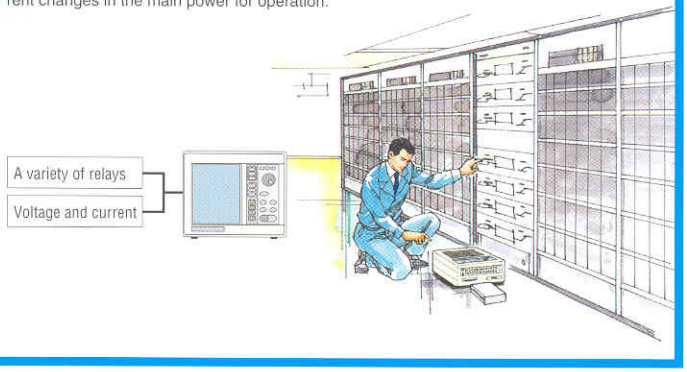
Flaw Detection in Conveyor Line in Steel Mill

By using the filing function, which operates synchronously with external signals, data can be acquired for a long term. Since the RA1000 Series is small and compact, it does not occupy a large measurement space.



Operation Test of Power Switchboards and Production Facilities

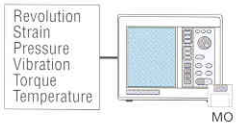
The RA1000 Series is used to measure the operation timing of relays and voltage and current changes in the main power for operation.

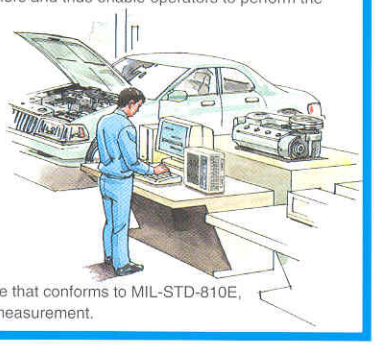


Torque Measurement of Engines or Motors

In automobile testing, measurement of revolution, strain, pressure, vibration, torque, temperature, etc is executed. The RA1000 Series incorporates a variety of amplifiers, which can eliminate the need to install separate amplifiers and thus enable operators to perform the tests in a small space.

By using the filing function of the RA1000 Series, long-term data storage in external media at a high sampling speed (200 µs max.) is possible.



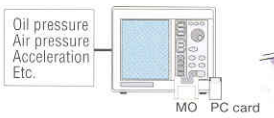


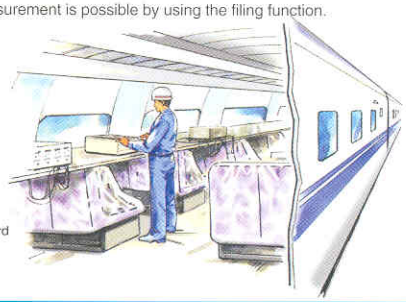
The RA1000 Series has a vibration resistance that conforms to MIL-STD-810E, enabling use in both bench tests and in-car measurement.

Wide Variety of Tests in Railroad Car

The RA1000 Series can accept oil pressure, air pressure, and acceleration in its AC strain amp, and save the data in the MO directly. Since the RA1000 Series incorporates strain amplifiers, external amplifiers are not necessary, which makes the measurement system compact.

Also, a long-term multi-channel measurement is possible by using the filing function.

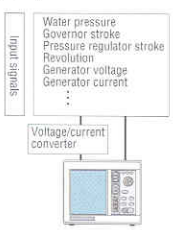


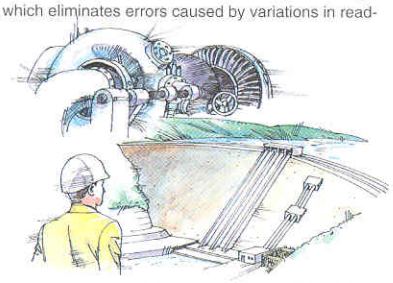


Governor Test

The RA1000 Series is used as a recorder for the governor test, in which changing signals such as water pressure, revolution, generator voltage, current, governor, stroke, and pressure regulation stroke are recorded.

Since the data saved in the memory can be automatically stored in a PC card, database creation is possible without expending excessive time and effort. After storing the data, you can confirm the data on the monitor, which eliminates errors caused by variations in reading by operators.





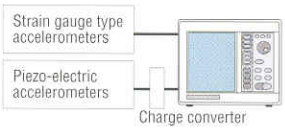
Drop Test for Package

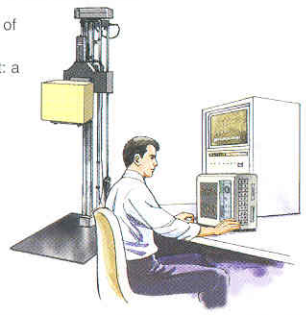
A drop test for packages is performed in order to avoid the damage that may occur during delivery of packaged electronic equipment.

Generally, packages contain materials for packing to absorb shock.

This test measures the impact acceleration to obtain the data that is used for the improvement of materials for packing. There are two types of accelerometers that can be used in the drop test: a piezo-electric type or a strain gauge type.

The RA1000 Series supports both types.



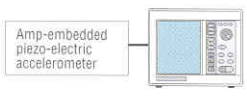


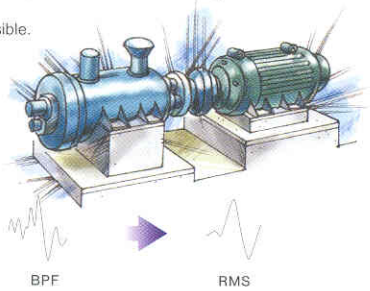
Monitoring of Vibration Level of Rotating Machine

In order to maintain rotating equipment such as motors, gears, bearings, piezo-electric accelerometers are used to check their vibration level.

In this case, a band-pass filter that picks up the signals in the vicinity of the frequency of the rotation is used and RMS conversion is performed based on the signals so that the level changes become more visible.

Waveform judgment setting is also possible.





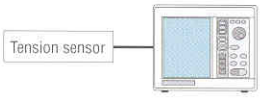
Magnus Test

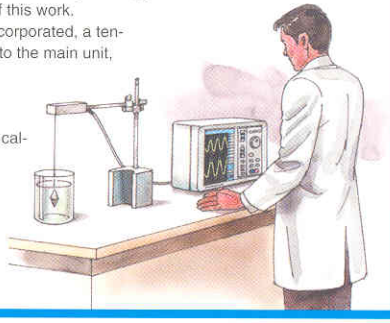
A Magnus test is a test to examine the response of a sample of tissue that expands or contracts, such as the blood vessel, enteron, or trachea of a mouse or rat, to the medicine applied to the sample.

This test requires a lot of repetition work. The filing and trigger functions of the RA1000 Series provide automatic processing of this work.

Moreover, since strain amps can be incorporated, a tension sensor can be directly connected to the main unit, thus eliminating troublesome cabling.

In addition, an operator can examine waveforms on the monitor during data acquisition and readout current values calculated by physical conversion.





Main Unit Specifications

Basic Specifications

Display Block	10.4-inch TFT color LCD Effective screen area: 211.2 mm x 158.4 mm (640 dots x 480 dots)
Printer Block (RA1200/RA1300)	
Printing method	Thermal printing using a thermal head
Paper Width	219.5 mm
Effective Recording Width	1 split (200mm•FS) to 16 splits (10mm•FS), Number of split and printing width can be changed.
Channel Discrimination	Prints channel number in the vicinity of the printed waveform The ON/OFF function is available.
Battery Backup	Backup Contents: Main unit settings, Recording conditions Backup time: About 1 month (if fully charged and used under normal temperature)
Storage Devices	A built-in 3.5-inch floppy disk drive (1.25MB/1.44MB) PC card slot (ATA flash memory card, SRAM card) Built-in MO unit (640, 540, 230, and 128MB supported): optional
Interface	RS-232C unit (38400 to 2400 bps): optional GP-IB unit (IEEE488 compliant): optional SCSI unit (50-pin type): optional
Remote Terminal	Start/stop, mark print, and paper feed are available by external signal, synchronous pulse Input, protect input, output of waveform judgement results, and error output
Clock Function	Stability: Daily error within ±35 PPM (at normal temperature)
Operating Environment	Temperature: 0 to 40°C (5 to 40°C when FFD is operating) Humidity: 35 to 80% RH (without condensation) Vibration Resistance: MIL-STD-810E compliant (except when FD or MO is operating)
Power Supply	90 to 132 VAC/180 to 264 VAC (to be specified when ordering) Frequency 47 to 63Hz DC power unit (optional) In use: 11 to 28 VDC(AC power is prioritized)
Power Consumption (Maximum)	RA1100: Approx. 85 VA RA1200: Approx. 180 VA (About 85 VA during stand-by) RA1300: Approx. 350 VA (About 85 VA during stand-by)
Dimensions	Approx. 369.5 (W) x 150.5 (H) x 301(D) mm
Weight	Approx. 6.6kg (RA1100 main unit with four 2-ch high-resolution DC amps) Approx. 7.5kg (RA1200 main unit with four 2-ch high-resolution DC amps) Approx. 7.5 kg (RA1300 main unit with four 2-ch high-resolution DC amps)

Trigger Specifications

Trigger Mode	OR, AND, A•B, WINDOW
Trigger Source	Input Signal, time trigger (starting time, ending time, measurement interval), manual trigger and external trigger
Trigger Setting	Amps other than event amps Trigger Slope OR, AND .... ↑ or ↓ A•B... ↑ or ↓ for each A,B source WINDOW... OUT or IN Level Setting: To be set with physical values (e.g. voltage)
	Event Amp State Settings: H, L, or OFF can be set for each input (without trigger slope) When OFF is set, trigger condition is not applied. Trigger Setting: AND or OR of the state setting conditions of inputs from 1 to 8
Trigger Related Functions	Pre-trigger , trigger pass count, trigger filter, and trigger mark

Other Specifications

Print Functions (RA1200/RA1300)	
Data Information	Measurement mode, year/month/day, Measurement start time, Data No., Trigger conditions (Trigger point, Trigger year/month/day, Trigger time), Sampling speed, Chart speed, Time axis, etc. are printed simultaneously with waveform print). ON/OFF function is available.
Channel Information	Input unit settings are printed simultaneously. ON/OFF function is available.
Mark print	In the real-time mode, the mark print is available (M date/time)
List Print.	Date, time, measurement mode, data No. , record form, chart speed, sampling speed, scale printing, back-light auto-off, auto start, buzzer click, trigger mode, source channel, recording operation, filing setting printout
Screen Copy Function	Prints hard copies of the contents shown on the screen
A4 report output	Registers free comments and prints them together with the waveform printing
Printing Line Width	Sets baseline boldness (1, 2, 3, 4 dots) for each channel
Key Lock Function	Invalidates key input to prevent erroneous operation
Storing and Reading of Settings	Up to four conditions for input unit and main unit settings are stored in the main unit memory
Physical Value Conversion	Physical conversion of input signal, full-scale modification of display
Stand-by Function	When the main unit is restored from blackout or temporary halt, original state is regained.(Except when filing)
Automatic Setup Function	By presetting a floppy disk containing the measurement conditions in FD drive, the conditions are automatically read when turning on the power.
Storing the Screen Image	Stores a screen image in bitmap format into a floppy disk
Help Function	Displays the handling method, cautions, etc.
RS-232C Unit Function	
Remote Control	Controls the main unit from a personal computer via the RS-232C cable.
FAX Transmission Function	Sends measured waveform by using a FAX modem connected to RS-232C.
GB-IB Unit Function	
Remote Control	Controls the main unit from a personal computer via GB-IB cable.
SCSI Unit Function	
	Stores data to MO or PD as external memory devices.

AC Bridge Power Supply Unit (Optional)

Function	Bridge power source for 2-ch AC strain amp
Power Voltage, Carrier Wave	2 Vms, Sine wave 5kHz
Synchronism	Synchronization with other RA1000s using a built-in AC bridge power unit is available.

Memory Mode

Measurement Operation	Once, Repeat, Endless
Memory Capacity	256kW/CH (Max.1 MW/CH optionally possible) *When function operation is used, memory capacity is 1/4 When two channels are used, 2MW/CH is the maximum
Memory Division	1, 2, 4, 8, 16, 32, 64, and 128 divisions
Sampling	1 µs (1 MS/s) to 1 s(1 S/s), User-settable External synchronization enabled
Display (Replay Monitor)	
Waveform Display	Display magnification :x5 to x1/1000
X-Y Display	X-Y display where data of an any channel is shown on the X axis, and other channel on the Y axis. Display step: 1 to 1000 steps
Print (RA1200/RA1300)	
Waveform Print	Print Density: Voltage axis: 8 dots/mm Time axis: 10 dots/mm Copy magnification: x5 to x1/1000
Alphanumeric Print	Readout Interval : 1 to 1000 steps
X-Y Print	X–Y print where data of an any channel is shown on the X axis, and other channel on the Y axis. Effective print range : 200 mm x 200 mm Print density : 400 dots (X axis) x 400 dots (Y axis) Display step : 1 to 1000 steps
Memory Filing	Each time data is stored into memory, the data is saved in the memory device in the binary or CSV format.

Real-Time Mode (RA1200/RA1300)

Waveform Printing	
Measurement Starting Operation	Starts with the Start key, by the trigger detection, or at set time. Interval recording available.
Paper Speed	25 mm/s to 1 mm/sec (RA1200), 100 mm/s to 1 mm/min (RA1300), User settable. External synchronization enabled
Frequency Response	DC to 100 kHz (sampling points: 10 points/cycle), Varies depending on the input units
Printing Density	Voltage axis : 8 dots/mm Time axis : RA1200: 10 dots/mm RA1300: 20 dots/mm at 100 mm/s 40 dots/mm at 50 mm/s 80 dots/mm at 25 mm/s
Printing Length	Continuous or 1 to 1000 division-shot feeding
Alphanumeric Printing	
Sampling	1 s to 1 hour, User settable, External synchronization enabled
Pringing Length Setting	Continuous or 1 to 1000 data shot feeding
X–Y Printing	
Performance	X–Y recording where data of an any channel is shown on the X axis, and other channel on the Y axis. Continuous recording until stop button is pressed (pose function available)
Effective Printing Range	200 mm x 200 mm
Printing Density	400 dots (X axis) x 400 dots (Y axis)
Printing Speed	10 ms or more
Backup Filing	Stores the measured data in a memory device in real-time Recording Speed: Synchronized with paper speed

Transient Mode

Transient Recording (RA1200/RA1300)	
Function	Normally operates in the real-time mode. When trigger is detected, the mode is switched to the memory mode.
Real-time Section	In conformance with the waveform printing in the real-time mode
Memory Section	In conformance with data storage and printing in the memory mode
Transient Filing	
Function	Normally operates in backup filing, data is saved in a memory when trigger is detected, and when measurement finishes, the memory data is sared.
Real-Time Section	In conformance with backup filing in the real-time mode
Memory Section	In conformance with memory filing in the memory mode

Main Unit Specifications

Filing Mode

Data Recording	
Function	Stores the measured data real-time to a memory device (Real time filing)
Recording Speed	200 µs to 60 s. Maximum recording speed varies depending on number of channels and recording device. User settable External synchronization ennobled
Recording Method	Select normal or ring Ring recording is possible (Repeated recording during set time)
Waveform Printing (RA1200/RA1300)	
Function	Prints the waveform of input signal
Paper Speed	25 mm/s to 1 mm/m (RA1200), 100 mm/s to 1mm/m (RA1300) User Settable External synchronization enabled
Frequency Response	DC to 100 kHz (sampling point: 10 points/cycle), Varies depending on the input units
Printing Density	Voltage axis : 8 dots/mm Time axis : RA1200: 10 dots/mm RA1300: 20 dots/mm at 100 mm/s 40 dots/mm at 50 mm/s 80 dots/mm at 25 mm/s

FFT Unit (Optional)

1 Signal Analysis	Linear spectrum, power spectrum, RMS spectrum, power spectrum density, and octave analysis (1/1, 1/3)
2 Signals Analysis	Transfer function, coherence function, and cross-power spectrum
Window Function	Rectangular, hanning, hamming, exponential, force
Addition Processing	Simple additional average (time axis), simple additional average (frequency axis), exponential weighted average (frequency axis), and peak hold
Analysis Frequency	400kHz, 200kHz, 80kHz, 40kHz, 20kHz, 10kHz, 5kHz, 2kHz, 1kHz, 500Hz, 200Hz, 100Hz, 50Hz, 20Hz, and 10Hz
Resolution	400 (1000), 800 (2000), 1600 (4000) Numbers in parentheses indicates the number of sampling points.

Arithmetic Operation Unit (Optional)

Sectional Statistical Operation	Maximum value, minimum value, P-P value, average value, area, effective value, standard deviation, rising time, falling time
Function Operation	Four-function calculation, absolute value, differential, integration, secondary differential, double integration, square root, exponential, common logarithm, moving average, and trigonometric functions (sin, cos, tan, asin, acos, atan)

Waveform Judgment Unit (Optional)

Function	Measures waveform of input signals of eight channels, and outputs the results of waveform judgement
Targets of Outputting Results	Print on paper, FAX, data storage, or remote terminal output

Input Unit Specifications

2-CH High Resolution Amp (AP11-101)

Input	2 channels/unit, isolated unbalanced input, isolated BNC connector
Input coupling	AC and DC coupling
Input impedance	1 MΩ or higher
Measurement range	0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200, and 500 V
Range accuracy	Within 0.3% FS (Within 0.8% FS at 500 V)
Offset accuracy	Within 0.3% FS (at 25°C)
Linearity	Within 0.1% FS
Allowable input voltage	Range of 10 V to 500 V: 500 V max. (AC or DC peak values) Range of 0.1 V to 5 V: 100 V max. (AC or DC peak values)
CMV	Unit only: 43 V (AC or DC peak values) When using isolated BNC cable (optional): 300 VAC
Frequency response	At DC coupling: DC to 50 kHz (+0.5, -3 dB) At AC coupling: 0.3 to 50 kHz (+0.5, -3 dB)
Low-pass filter	Bessel type (attenuation factor: -12 dB/OCT) 30, 300, 3 kHz, and OFF (+0.5, -3 dB)
A/D converter	16 bits, 100 kHz max. (two channel simultaneous sampling)
Temperature stability	Zero point: Within 0.03% FS/°C Gain (range): Within 0.01% FS/°C
Weight	230 g

2-CH High Speed Amp (AP11-103)

Input	2 channels/unit, isolated unbalanced input, isolated BNC connector
Input coupling	AC and DC coupling
Input impedance	1 MΩ or higher
Measurement range	0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200, and 500 V
Range accuracy	Within 0.3% FS (Within 0.8% FS at 500 V)
Offset accuracy	Within 0.5% FS (at 25°C)
Linearity	Within 0.2% FS
Allowable input voltage	Range of 10 V to 500 V: 500 V max. (AC or DC peak values) Range of 0.1 V to 5 V: 100 V max. (AC or DC peak values)
CMV	Unit only: 43 V (AC or DC peak values) When using isolated BNC cable (optional): 300 VAC
Frequency response	At DC coupling: DC to 400 kHz (+0.5, -3 dB) At AC coupling: 0.3 to 400 kHz (+0.5, -3 dB)
Low-pass filter	Bessel type (attenuation factor: -12 dB/OCT) 50, 500, 5 kHz, and OFF (+0.5, -3 dB)
A/D converter	12 bits, 1 MHz max. (two channel simultaneous sampling)
Temperature stability	Zero point: Within 0.03% FS/°C Gain (range): Within 0.01% FS/°C
Weight	240 g

2-CH TC/DC Amp (AP11-106)

Input	2 channels/unit, isolated unbalanced input, terminal block ø4
Input coupling	DC coupling
Input impedance	10 MΩ or higher
Thermocouple	R, T, J, K, and W
Measurement range	R: 0 to 1600°C T: -200 to 400°C J: -200 to 1000°C K: -200 to 1350°C W: 0 to 2300°C
Voltage measurement range	100, 200, 500 mV, 1, 2, 5, 10, 20 and 50 V FS
Range accuracy	Temperature: Within 0.5% FS (Within 1% FS at 0°C or lower) Voltage: Within 0.5% FS
Cold junction compensation	Internal/external switchable Accuracy: Within 2°C (Within 1°C at stable temperature of 20°C at input terminal)
Linearity	Within 0.1% FS
Allowable input voltage	50 V (AC or DC peak values)
CMV	43 V (AC or DC peak values)
Frequency response	DC to 40 kHz (+0.5, -3 dB)
Low-pass filter	Bessel type (attenuation factor: -18 dB/OCT) 1, 30, 500, 5 kHz, and OFF (+0.5, -3 dB)
A/D converter	15 bits, 100 kHz max. (two channel simultaneous sampling)
Temperature stability	Accuracy: 0.04% FS/°C (When used as temperature amp) Zero point: Within 0.03% FS/°C (When used as DC amp) Gain (range): Within 0.01% FS/°C
Weight	240 g

TC/DC Amp (AP11-107)

Input	1 channel/unit, isolated unbalanced input, 2 binding posts
Input coupling	DC coupling
Input impedance	10 MΩ or higher (1 MΩ at 5, 10, 20, 50 V FS in DC amp)
Thermocouple	R, T, J, K
Measurement range	R: 0 to 800°C at 800°C FS and 0 to 1600°C at 1600°C FS T: -200 to 200°C at 200°C FS and -200 to 400°C at 400C° FS J: -200 to 200°C at 200°C FS and -200 to 1000°C at 1000°C K: -200 to 200°C at 200°C FS and -200 to 1200°C at 1200°C
Voltage measurement range	10, 20, 50, 100, 200, 500 mV, 1, 2, 5, 10, 20, and 50 V FS
Range accuracy	Temperature: Within 0.5% FS (Within 1% FS at 0°C or lower) Voltage: Within 0.5% FS
Linearity	Within 0.1% FS
Allowable input voltage	50 V (AC or DC peak values)
CMV	300 V (AC or DC peak values)
Frequency response	DC to 40 kHz (+0.5, -3 rB)
Low-pass filter	Bessel type (attenuation factor: -18 dB/OCT) 1, 30, 500, 5 kHz, and OFF (+0.5, -3 dB)
Reference junction compensation	Internal/external switchable
A/D converter	14 bits, 100 kHz max.
Weight	200 g

Input Unit Specifications

Event Amp (AP11-105)

Number of channels	8 channels/unit
Input type	Logic input isolated between each channel and chassis, Common ground in unit, case
Input signal	Sets voltage or contact for each channel Voltage input: Input voltage range 0 to +24 V Detection level H level...2.5 V or higher L level...0.5 V or lower Contact input: Close...250 or lower Open...2 kΩ or higher
Response time	1µs or faster (Input level should be +5 V or higher.)
Input connector	Round DIN connector 8P...2 pcs. Event amp side: XT2B-0800(Conformed to DIN45326)
Weight	100 g

2-CH AC Strain Amp (AP11-104)

Number of channels	2 channels/unit, isolated balanced input, NDIS connector
Applicable gauge resistance	120Ω to 1 kΩ
Bridge power supply	Sine wave 2 Vrms, 5 kHz (Bridge power supply is supplied separately.)
Gauge factor	1.9 to 2.2
Range of balance	Resistance: 2% (10000 µε) or lower Capacitance: 2000 pF or lower
Balance method	Resistance: Auto-balance Capacitance: Auto-balance (500 pF or lower, eliminating constantly) Balance time: Within 1s at 1 ch Within 0.5%Fs Remained voltage accuracy
Maximum sensitivity	Over full-scale at 500 µε (at 2 V or higher bridge voltage)
Measurement range	1, 2, 5, 10, 20 kµε FS
Internal calibrator and accuracy	0.5 k, 1 k, 2 k, 3 k, 5 kµε Accuracy: Within 0.5% FS
Linearity	0.2% FS
CMV	300 VAC
Frequency response	DC to 2 kHz (+0.5, -3dB)
Low-pass filter	Butterworth type (attenuation factor: -12 dB/OCT) 10, 30 , 100, 300 Hz, and OFF (+0.5, -3 dB)
A/D converter	16 bits, 100 kHz max.
Temperature stability	Zero point: Within 0.05% FS/°C Gain (range): Within 0.05% FS/°C
Weight	285 g

2-CH DC Strain Amp (AP11-110)

Number of channels	2 channels/unit, isolated balanced input, NDIS connector
Input coupling	DC
Input impedance	10 MΩ + 10 MΩ or higher
Bridge power supply	2 V and 5 V
Applicable gauge resistance	120 to 2 kΩ (at BV = 2 V), 350 to 2 kΩ (at BV = 5 V)
Gauge factor	2
Range of balance	2% (15000 µε) or lower
Balance method	Resistance: Auto-balance Balance time: 0.5 sec max. at 1ch Remained voltage accuracy: Within 0.3% FS
Measurement range	2, 5, 10, 20, 50 kµε FS (at BV = 2 V) 0.8, 2, 4, 8, 20 kµε FS (BV = 5 V)
Voltage measurement range	2, 5, 10, 20, 50 mV FS
Range accuracy	Within 0.3% FS
Linearity	0.1% FS
Allowable input voltage	8 V (DC or AC peak values)
Frequency response	DC to 50 kHz (+0.5, -3dB)
Low-pass filter	Bessel type (attenuation factor: -12 dB/OCT) 10, 30, 300 Hz, 1 kHz, and OFF (+0.5, -3 dB)
Temperature stability	Zero point: Within 0.1% FS/°C Gain (range): Within 0.01% FS/°C
CMV	300 VAC
A/D converter	16 bits, 100 kHz max
Weight	240 g

2-CH Vibration/RMS Amp (AP11-109)

Input	2 channels/unit, isolated unbalanced input, isolated BNC connector
Input coupling	AC and DC
Input impedance	10 MΩ or higher
Power supply for sensor	2 mA, 18 V or higher
Measurement range	0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500 V
Range accuracy	DC amp range: Within 0.3% FS (Within 0.8% FS at 500 V) RMS amp range: Within 2% FS (at DC and 40 Hz to 20 kHz)
Linearity	Within 0.1% FS
Crest factor	2.8 max. (RMS amp)
CMV	Unit only: 42 V (DC or AC peak values) When isolated BNC cable (optional) is used: 300 V AC
Frequency response	DC coupling: DC to 50 kHz (+1, -3 dB) AC coupling: 1 to 50 kHz (+1, -3 dB)
Low-pass filter	Butterworth type (attenuation factor: -24 dB/OCT) 30, 100, 300 Hz, 1 kHz, and OFF
High-pass filter	Butterworth type (attenuation factor: -24 dB/OCT) 10, 30, 100 Hz, and OFF
A/D converter	16 bits, 100 kHz max.
Temperature stability	Zero point: Within 0.02% FS/°C Gain (range): Within 0.01% FS/°C
Weight	270 g

2-CH FFT Amp (AP11-102)

Input	2 channels/unit, isolated unbalanced input, isolated BNC connector
Input coupling	AC and DC (only AC coupling when amp-embedded charge accelerometer is used)
Input impedance	1 MΩ or higher
Power supply for sensor	2 mA, 18 V or higher
Measurement range	0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500 V
Range accuracy	Within 0.3% FS (Within 0.8% FS at 500 V)
Linearity	Within 0.1% FS
Maximum input voltage	500 V (DC or AC peak values) (30 V at AC coupling of 0.1 to 5 V)
CMV	Unit only: 42 V (DC or AC peak values) When isolated BNC cable (optional) is used: 300 V AC
Frequency response	DC coupling: DC to 50 kHz (+0.5, -3 dB) AC coupling: 0.3 to 50 kHz (+0.5, -3 dB)
Low-pass filter	Bessel type (attenuation factor: -24 dB/OCT) 30, 300 Hz, 3 kHz, and OFF (+0.5, -3 dB)
Anti-aliasing filter	20, 40, 80, 200, 400, 800 Hz, 2, 4, 8, 20, and 40 kHz Drop characteristic: -72 dB typ. at 1.5 x fc
Offset accuracy	Within 0.3% FS (at 25 °C)
A/D converter	16 bits, 100 kHz max.
Temperature stability	Zero point: Within 0.02% FS/°C Gain (range): Within 0.01% FS/°C
Weight	240 g

F/V Converter (AP11-108)

Input	1 channel/unit, isolated unbalanced input, isolated BNC connector
Input coupling	AC and DC
Input impedance	100 kΩ or higher
Input frequency range	1 Hz to 10 kHz (Pulse width: 20 µs or longer)
Measurement range	0.1, 0.2, 0.5, 1, 2, 5, 10 kHz FS
Range accuracy	Within 0.5% FS (Within 0.8% FS at 500 V)
Linearity	Within 0.3% FS
Trigger level	Selectable from 0 V and 2.5 V
Allowable input voltage	100 V (AC or DC peak values)
CMV	Unit only: 42 V (AC or DC peak values) Between isolated BNC and safety terminal (optional): 300 VAC
Response time	Approx. 20 ms (at the range of 10 kHz)
A/D converter	16 bits, 100 kHz max.
Temperature stability	Zero point: Within 0.03% FS/°C Gain (range): Within 0.02% FS/°C
Weight	125 g

Charge Converter (AP11-901)

Gain	1.0 mV/pC ±5%
Max. input charge	5000 pC
Frequency range	Approx. 1.6 Hz to 50 kHz
Max. output voltage	5 Vp-p or lower
Drive voltage	12 to 25 VDC
Drive current	0.5 to 5.0 mA
Rated noise	20 µVrms or lower
Phase	180° (Inverted input is output.)
Operating temperature	-20 to 80°C
Connector	Input: Miniature connector (10-32) Output: Male BNC terminal
Weight	20 g

Charge Converter (AP11-902)

Gain	1.0 mV/pC ±5%
Max. input charge	5000 pC
Frequency range	Approx. 1.6 Hz to 50 kHz
Max. output voltage	5 Vp-p or lower
Drive voltage	12 to 25 VDC
Drive current	0.5 to 5.0 mA
Rated noise	20 µVrms or lower
Phase	180° (Inverted input is output.)
Operating temperature	-20 to 110°C
Connector	Input: Miniature connector (10-32) Output: Female BNC terminal
Weight	65 g

Charge Converter (AP11-903)

Gain	0.1 mV/pC ±5%
Max. input charge	50000 pC
Frequency range	Approx. 1.6 Hz to 50 kHz
Max. output voltage	5 Vp-p or lower
Drive voltage	12 to 25 VDC
Drive current	0.5 to 5.0 mA
Rated noise	20 µVrms or lower
Phase	180° (Inverted input is output.)
Operating temperature	-20 to 110°C
Connector	Input: Miniature connector (10-32) Output: Female BNC terminal
Weight	65 g

* Specifications are subject to change without notice.

Main Unit

	Name	Model	Rating
Main unit	Omniace II	RA1100	Data acquisition system without printer
		RA1200	Data acquisition system with printer, paper speed: 25 mm/s max.
		RA1300	Data acquisition system with printer, paper speed: 100 mm/s max.

*1 Input units are not included in the main unit.

Standard accessories	AC power cable x 1, Recording paper x 1 (RA1200/1300), Paper holder x 1 (RA1200/1300), Slot cover plate for input and interface units x 1 set, and user's manual x 1 set

Optional

	Name	Model	Rating	Remark
Input unit	2-ch high resolution DC amp	AP11-101	2 inputs/unit, isolated BNC connector	
	2-ch high speed DC amp	AP11-103	2 inputs/unit, isolated BNC connector	
	2-ch FFT amp	AP11-102	2 inputs/unit, isolated BNC connector	
	Event amp	AP11-105	8 inputs/unit (with logic IC probe)	
	2-ch TC/DC amp	AP11-106	2 inputs/unit, terminal block ø4	
	TC/DC amp	AP11-107	1 input/unit, 2 binding posts	
	2-ch AC strain amp*2	AP11-104	2 inputs/unit, NDIS connector	
	2-ch DC strain amp	AP11-110	2 inputs/unit, NDIS connector	
	2-ch Vibration/RMS amp	AP11-109	2 inputs/unit, isolated BNC connector	
	F/V converter	AP11-108	1 input/unit, isolated BNC connector	

*2 AC bridge power supply (RA11-109) is necessary.

Interface	GP-IB	RA11-105		
	RS-232C	RA11-106		Necessary for faxing and communication via modem
	SCSI*3	RA11-107	For external MO drive*4	

*3 Either SCSI (RA11-107) or built-in MO (RA11-108) can be installed.

*4 Contact us for the model that can be connected.

Built-in	Expansion memory*5	RA11-126	16 M word	
	MO drive unit*6	RA11-108	with SCSI interface	
	AC bridge voltage	RA11-109	with synchronous terminal	
	DC power unit*5	RA11-110	DC power operation (11 to 28V DC)	

*5 Expantion memory (RA11-126) to be specified when ordering main unit.
*6 Either MO drive unit (RA11-108) or DC power unit (RA11-110) can be installed.

Function	FFT	RA11-751		Provided with 3.5 inch floppy disk
	Arithmetic operation	RA11-752		
	Waveform judgement	RA11-753		

Separately available equipment	Hard carrying case with casters	RA11-117		
	Soft carrying case	RT36-115		
	Dust cover	RA11-121		
	Display cover	RA11-122		
	Touch panel cover sheet	RA11-123	3 sheets/set	
	Roll paper take-up	RT31-164		For RA1200 and 1300
	Z-fold paper storage box	RA12-103	Includes Z-fold paper adapter (RA12-301)	
	Z-fold paper adapter	RA12-301		
	Mobile cart	RA11-118		

Optional

Charge converter*7		AP11-901	10 mV/pC, small type (connected to input amp), Connectors: miniature connector input and BNC male output	
		AP11-902	1.0 V/pC, Connectors: miniature connector input and BNC female output	
		AP11-903	0.1 mV/pC, for high sensitivity sensors, Connectors: miniature connector input and BNC female output	

*7 Necessary when piezo-electric type accelerometers without built-in amplifier are used to connect with 2-ch vibration/RMS amp, RMS amp, or 2-ch FFT amp.

Voltage probe	AC/DC voltage detector	1539	Four inputs	
	AC voltage level detector	1540	One input, 100 VAC/120 VAC	
		1543	One input, 220 VAC/240 VAC	
	Voltage output cable	0311-5004	Length: 1.5 m, Connectors: pin tip and banana plug	
	Voltage output extension cable	0311-5006	Length: 1.5 m, Connectors: pin tip and pin tip jack	
Input/Output cable	Cable for signal input	0311-5175	Length: 2m, Connectors: isolated BNC connector and alligator clip (+: red, -: black)	
		0311-5198	Length: 2m, Connectors: isolated BNC without clip (conform to CE)	
		0311-5200	Length: 2m, Connectors: isolated BNC connector and metal BNC connector, CMV: 30 Vrms or 60 VDC max.	
		0311-5158*8	Length: 2m, Connectors: S terminal and alligator clip (+: red, -: black)	
		0311-5155*8	Length: 2m, Connectors: S terminal and open wire	
		0311-5173*8	Length: 2m, Connectors: S terminal and BNC connector, CMV: 30 Vrms or 60 VDC max.	
		0311-5160*8	Length: 2m, Connectors: 2-banana plug and alligator clip (+: red, -: black)	
		0311-5174*8	Length: 2m, Connectors: 2-banana plug and BNC connector, CMV: 30 Vrms or 60 VDC max.	
	AC bridge power distribution cable	0311-2057	Length: 2m, BNC connector and alligator clip (+: red, -: black), mold color: black	
		0311-5084	Length: 2m, BNC connector and alligator clip (+: red, -: black), mold color: red	
		47226	Length: 2m, BNC connector to BNC connector	
	Logic IC cable	0311-5007	Logic IC cord (1 pc.)	Two sets are provided for each event amp (AP11-105)
		0311-5008	IC clip cord (4 pcs./set)	
		0311-5009	Alligator clip cord (4 pcs./set)	
	Event input cable	0311-5001	1.5 m, DIN8P and open wire	
	Event input extension cable	0311-5005	1.5 m, DIN8P plug and DIN8P socket	
Adapter	BNC adapter	0243-3021	Isolated BNC and S terminal plug	
	BNC adapter (for distribution)	0243-2118	AC bridge power distribution	
Power supply cable	AC power cable	47326	Length: 2.5 m with adapter	

*8 To connect the isolated BNC connector, BNC adapter (0243-3021) is necessary.

Communication cable	GP-IB cable	47752	Length: 2 m	
	RS-232C cable	47674	D-sub 25 pin connector and D-sub 25 pin connector	
		0315-1975	D-sub 25 pin connector and D-sub 9 pin connector	

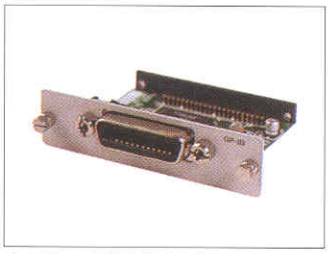
Software	OMNIVIEW*9	NS1100	Windows95/98, for online and offline measurement	

*9 Internet Explorer Ver.5.0 or later should be preinstalled in the computer.

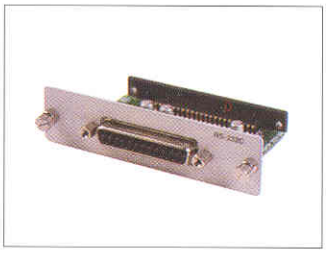
Storage media	ATA flash memory card	HB289008A4	8 Mbytes (settings and data)	Hitachi
		HB289016A4	16 Mbytes (settings and data)	
		HB289032A4	32 Mbytes (settings and data)	
		HB289048A4	48 Mbytes (settings and data)	
		HB289064A4	64 Mbytes (settings and data)	
		HB289080A4	80 Mbytes (settings and data)	
		HB289096A4	96 Mbytes (settings and data)	
		HB289160A4	160 Mbytes (settings and data)	
	SRAM card	YMC101	64 Kbytes (settings) JEIDA Ver.4 conformed	
		YMC102	512 Kbytes (settings and data) JEIDA Ver.4 conformed	
		YMC103	1 Mbyte (settings and data) JEIDA Ver.4 conformed	
		YMC104	2 Mbytes (settings and data) JEIDA Ver.4 conformed	

Recording paper	Recording paper	YPS106	220 x 30 m roll paper (5 rolls/box)	
	Recording paper (with perforated line)	YPS108	220 x 30 m roll paper (5 rolls/box)	
	Recording paper (Z-fold paper)	YPS112	220 x 201 m Z-fold paper (1 set/box)	

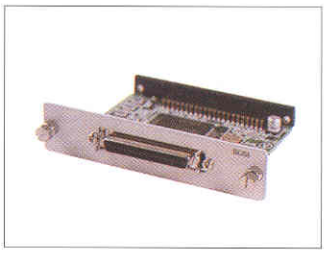
Optional Devices



GP-IB unit (RA11-105)



RS-232C unit (RA11-106)



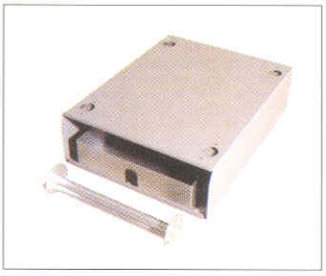
SCSI unit (RA11-107)

Built-in MO unit (RA11-108)

Soft carrying case (RT36-115)

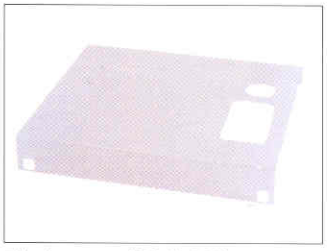
Hard carrying case (RA11-117)

Mobile cart (RA11-118)



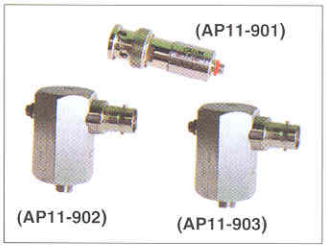
Z-fold paper storage box (RA12-103) (AP11-901)

Roll paper take-up (RT31-164)



Display cove (RA11-122)

DC power unit (RA11-110)



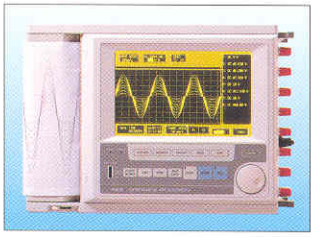
Charge converters

omniace series

RT3303/3304

- RT3303 3 chs + 8 events
- RT3304 4ch
- 5-inch LCD
- Compact and light weight

RT3000N



- RT3108N 8 chs 128 mm chart width
- RT3208N 8 chs 216 mm chart width
- RT3216N 16 chs 216 mm chart width
- 9 inch EL display with touch screen

RT3608

- 8 chs 219.5 mm chart width
- 10.4 inch TFT color LCD with touch screen
- Full functions built in as standard

RT3424/RT3424ST

- RT3424 24 chs
- RT3424ST 23 chs with AC strain amps
- 219.5 mm chart width
- 9 inch EL display with touch screen

Distributor :

NEC

Catalog ref: 031

U1000A3 Printed in Japan