

DATA ACQUISITION SYSTEM

NEC

# omniace

## RA2300

“Fast Measurements - Easy Operation - Every time”

Omniace - The Newest Generation



NEC San-ei Instruments, Ltd.

<http://www.necsan-ei.co.jp/osd>



ISO9001  
JQA-1598



ISO14001  
JQA-EM0260  
HEAD OFFICE

# Easy Measurements by Anybody Any Time!! Long-term Recording on built-in HDD!!

omniace  
RA2300



The Omniace RA2300 is a unique Data Acquisition Recorder designed for simple user operation, quick set-up, easy data acquisition, convenient color display of data, and high resolution chart recorder print-out, all in a self-contained, portable package. Graphical amplifier set-up and signal waveforms are brilliantly displayed on a large, color LCD. A full range of plug-in modules condition signals for various measuring modes including HD Recording (for long term recording on a built-in 40GB HDD), Memory Recording (high speed transients/events), and Real Time Recording (like pen recorder). The RA2300 is ideal for Maintenance, Production, Quality and R&D applications.

## FEATURES

### Large Color Screen Display

A large 12.1" full color LCD touch screen displays set-up information and acquired data in real time or from memory. View before print or print while viewing data.

### Unique Pen Recorder Mode

Clear graphic, touch to set, amplifier control images eliminate complicated recorder setup. Displayed data signals appear to originate from graphic writing pen nib image while data is recording.

### Enhanced Ease of Stored Data Access

Finding and displaying recorded data has never been easier. Many search features for finding specific data points within a large data file are included. A Thumbnail Bar displays all recorded channel data, while a Jump search function finds max/min points, time, etc.

### Direct Sensor Input

Sensors may be directly connected to the wide selection of plug-in signal conditioning amplifiers to measure AC/DC Voltage, AC/DC Strain, Temperature, Vibration, Pressure, Rotation Pulses, Frequency, etc.

### Long-term Recording

A built-in 40GB HDD provides long-term, high speed data recording for 120 days on 16-channels with a 10mS simultaneous sampling rate!

### Standard LAN & USB Ports

LAN (100BASE-T) for data communication and USB for external storage devices (MO/USB memories) are standard interfaces.

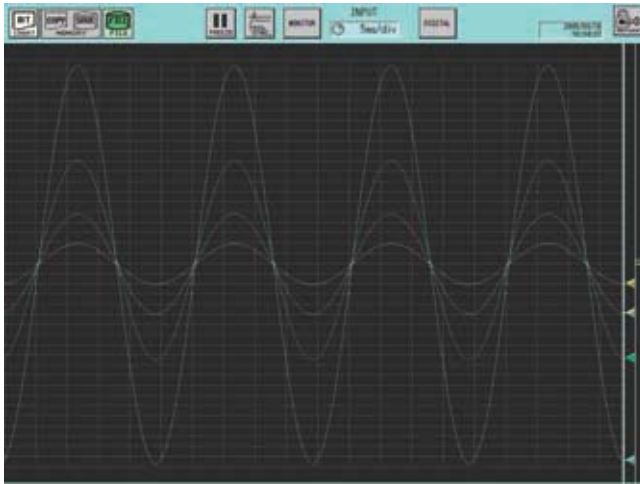
### Built-in Chart Printer

A high resolution, thermal array printer with wide chart paper allows high-speed real time chart printing at 100mm/sec or prints stored files, and portions thereof, on demand.

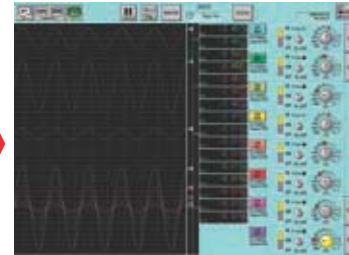
# Measurements Unlimited - Easy Operation - Clear Displays

## Dynamic Waveform Display

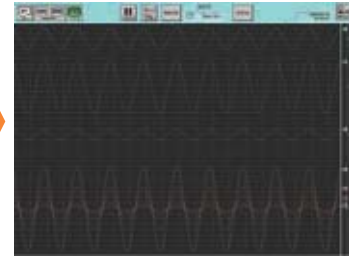
Control Settings, Real Time Recorded Data, and Data Stored in Memory are displayed on a large, 12.1" color touch screen. User selects 1 to 16 channels of waveform and/or numeric value data to be displayed.



- Full Screen Display - 12.1" Color LCD



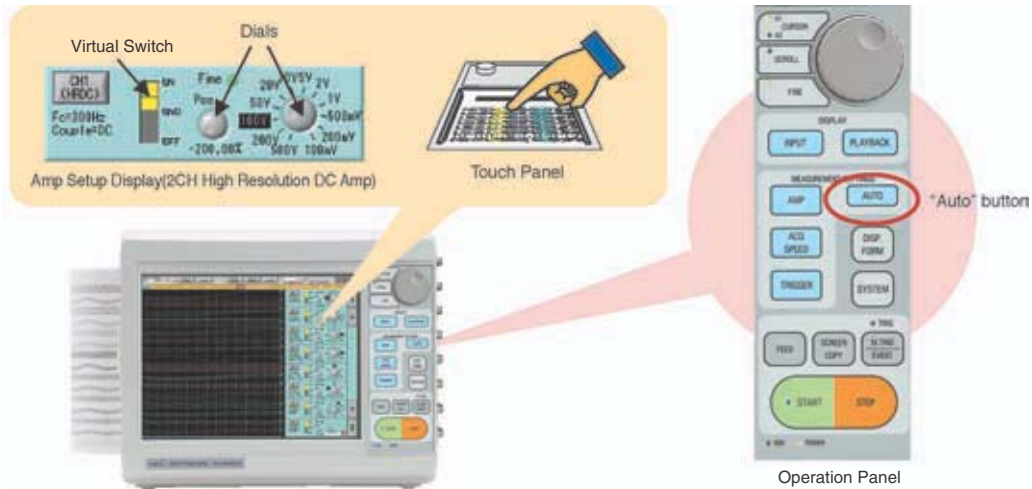
Selectable - Numeric Value + Amp Control Display



Divide 1 to 16 Channels - Select Channelized or Overlapping

## Special Features for Easy Operation

Setup mode screen graphics display selector dials/switches that change position with a simple "finger touch" or using the jog dial. By using the 12.1" color touch panel LCD, measuring conditions can be modified while monitoring waveforms. Each input amplifier can also be automatically set using the "auto" pushbutton on the operation panel.



## Direct Sensor Input

The same amplifiers (AP series) from RA1000 series are available for direct input of various signals (voltage, strain, temperature, vibration, pressure and rotation pulses).

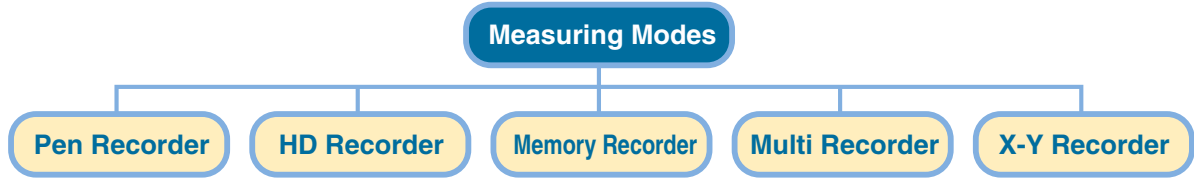


AP Amp Series

Item	Model No	Sampling	Resolution	Description
2-ch High Resolution DC Amp	AP11-101	10 $\mu$ s	16-bit	DC amp for high resolution measurement
2-ch High Speed DC Amp	AP11-103	1 $\mu$ s	12-bit	DC amp for high speed measurement
2-ch Zero Suppression Amp	AP11-111	10 $\mu$ s	16-bit	DC amp for gaining signal changes by eliminating offset element of input signals
2-ch FFT Amp	AP11-102	10 $\mu$ s	16-bit	DC and vibration amp with high frequency anti-aliasing
Event Amp	AP11-105	1 $\mu$ s	N/A	Amp for recording open/close for contact or H/L for voltage
2-ch TC/DC Amp	AP11-106	10 $\mu$ s	15-bit	Input amp for thermocouple (R, T, J, K and W) and voltage
TC/DC Amp	AP11-107	10 $\mu$ s	14-bit	1-ch input amp for thermocouple (R, T, J and K) and voltage
2-ch AC Strain Amp	AP11-104	10 $\mu$ s	16-bit	Strain amp which reduces influence of external noises (AC bridge system)
2-ch DC Strain Amp	AP11-110	10 $\mu$ s	16-bit	Strain amp with DC bridge system
2-ch Vibration/RMS Amp	AP11-109	10 $\mu$ s	16-bit	DC/vibration amp for measuring signals in RMS
F/V Converter	AP11-108	10 $\mu$ s	12-bit	Amp for converting frequency (pulse) into voltage

# User Selectable Measurement Modes

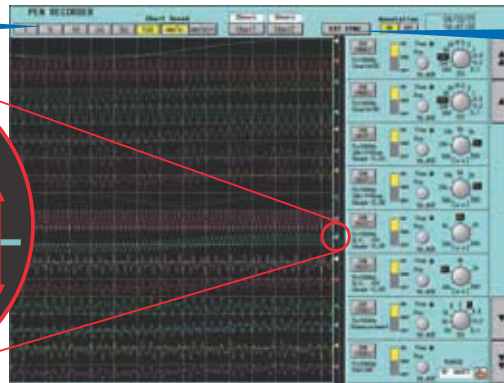
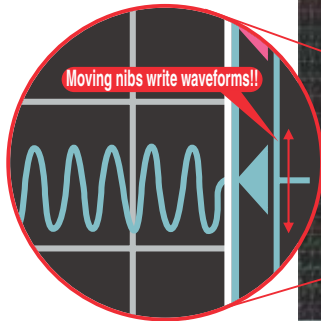
Users can easily select from five (5) Measurement Modes Pen Recorder mode for real time strip chart recording, HD Recorder mode for long term recording of data to a HDD, X-Y Recorder mode for displaying/recording X-Y correlation of two signals, a Multi Recorder mode captures transients while recording steady - state signals, and a Memory Recorder mode for recording fast events.



## Pen Recorder with Virtual Pens

The Pen Recorder mode offers the simple operation of common strip chart pen recorders. All waveforms are displayed with "moving pen nib" images. And, like pen recorders, input amplifiers and chart paper speed (100mm/s to 1/mm/min) can be changed while recording using the touch panel.

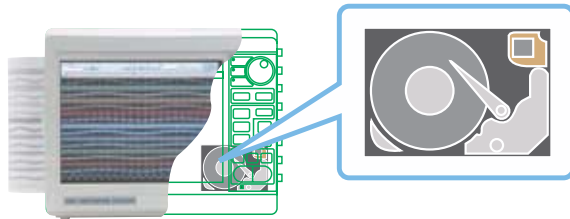
Easy change of paper feeding speed by one touch



Synchronized waveform recording with external signals  
\*\*\*A remote unit(optional) is required.

## HD Recorder for Long-term Recording

Long-term data recording is available on a standard built-in HD(40GB). Fast speed recording can be done at 1 μs with 1 channel and at 10 μs with 16 channels. Since data is digitally saved, after-record analysis or long-period management of data, which is not an option for recording paper, is possible.



Recordable Time on HardDisk

Sampling Speed	2GB Capacity		40GB Capacity	
	w/1ch	w/16chs	w/1ch	w/16chs
1 μs	17 min	N/A	4.9 hrs	N/A
2 μs	34.1 min	N/A	9.7 hrs	N/A
5 μs	1.4hr	N/A	1 day	N/A
10 μs	2.8 hrs	10.6 min	2 days	3.1 hrs
20 μs	5.5 hrs	21.0 min	4 days	6.0 hrs
50 μs	13.8 hrs	52.0 min	10 days	15.2 hrs
100 μs	1.1 day	1.7 hr	20.7 days	1.2 day
200 μs	2.3 days	3.5 hrs	40.5 days	2.5 days
500 μs	5.8 days	8.7 hrs	101 days	6.3 days
1ms	11.8 days	17.7 hrs	207 days	12.9 days
2ms	23.7 days	1.4 day	414 days	25.9 days
5ms	59.2 days	3.7 days	1037 days	64 days
10ms	118 days	7.4 days	2074 days	129 days

\*\*\*Above data is calculated value.

## Memory Recorder Captures Fast Events

Record fast events using up to 1 μs sampling rates and store to internal memory of 2MW per channel. Unused channel memory can be combined up to 32MW if only one channel is active. Multiple trigger modes ensure capture of data for a wide variety of measurement applications.

Recordable Time on Memories

Sampling Speed	w/ 1 ch	w/ 16 chs
	Memory(32MW)	Memory(2MW/CH)
1 μs	32.768 sec	2.048 sec
2 μs	1.09 min	4.096 sec
5 μs	2.73 min	10.24 sec
10 μs	5.46 min	20.48 sec
20 μs	10.9 min	40.96 sec
50 μs	27.3 min	1.7 min
100 μs	54.6 min	3.41 min
200 μs	1.8 hr	6.8 min
500 μs	4.5 hrs	17 min
1ms	9.10 hrs	34.1 min
2ms	18.2 hrs	68.3 min
5ms	1.89 day	2.8 hrs
10ms	3.79 days	5.7 hrs
100ms	37.9 days	2.37 days

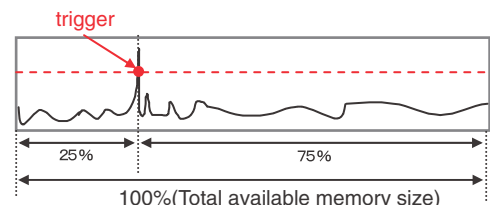
\*\*\*Above data is calculated value.

### Trigger Mode

- OR: Activates if signal of ANY selected channel reaches trigger level.
- AND: Activates if signals of ALL selected channels reach trigger level.
- WINDOW: Activates if signal of selected channel(s) enters or exceeds preset levels.

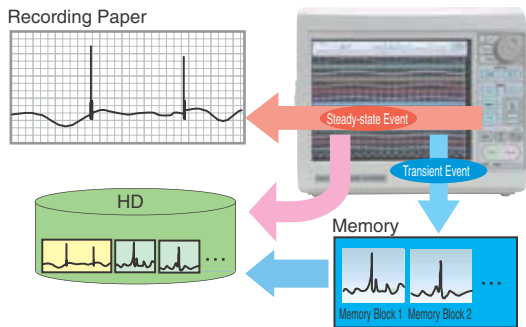
### Pre-trigger Function

This function allows user to memory-record data before trigger point. Extent of pre/post trigger point can be preset as proportion of total available memory size.



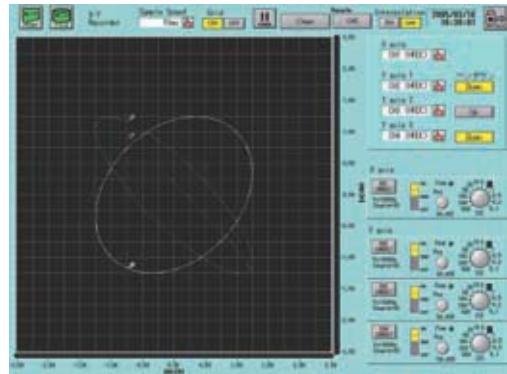
## Multi Recorder Simultaneously Records Steady-state & Transient Events

Chart printing, and recording to HDD and Memory can be simultaneously performed in this mode. A steady-state signal can be printed or recorded on the HDD while the system captures high-speed transient events to memory.



## X-Y Recorder

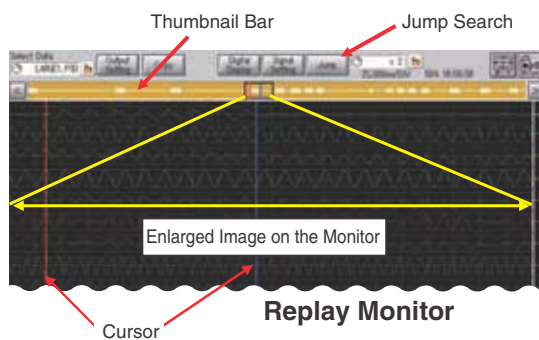
Select any channel as the X input and up to 3 channels for the Y input. Signals are recorded and can be plotted for display and printing with high resolution (1600 x 1600 dots).



# Various Features (Replay Monitor)

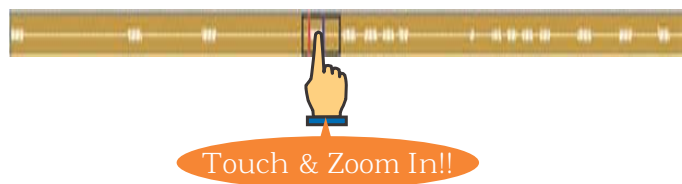
## Easy Search of Large Data

Below functions are available for searching long-term and large data easily.



### Thumbnail Bar:

This function displays a waveform image (selected one channel) of recorded data on a thumbnail bar. It does not only allow users to see whole waveform image easily but to get enlarged image by touching.

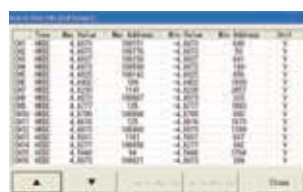


### Jump Search:

There are four jump search modes as followings.



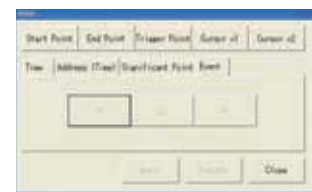
Time...  
Move to specified time



Max/Min...  
Move to max/min of recorded data



Address(Time)...  
Move to elapsed time from start

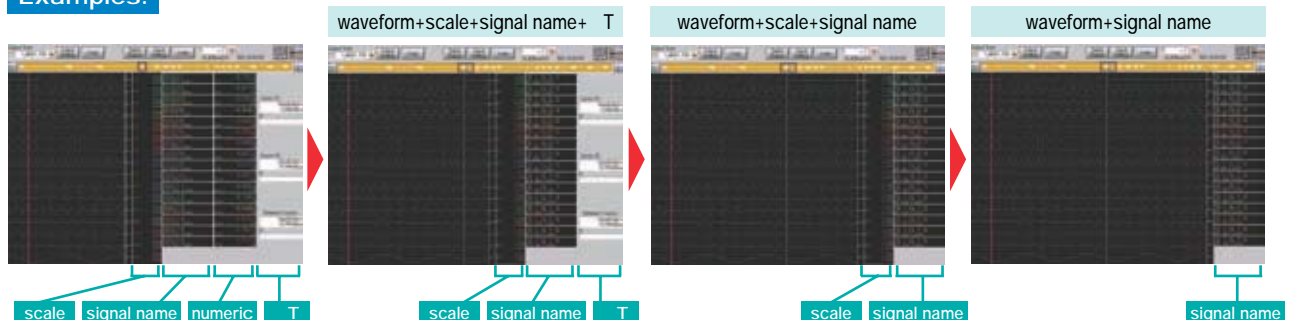


Event...  
Move to marked event

## Numeric Display of Waveform

The replay monitor can also display "scale", "signal", "numeric" and "delta T between two cursors" at user's choice.

### Examples:



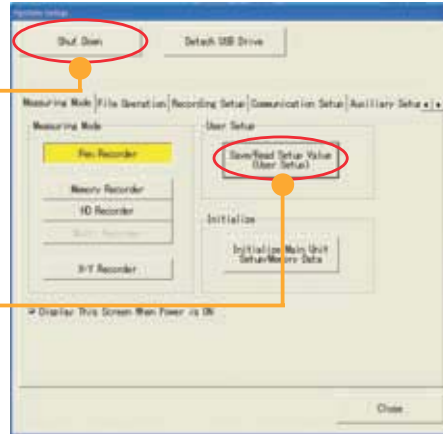
# Useful Functions

## Shutdown

Power-off through “ shutdown ” allows users to save measurement conditions and measured data kept in memories on HD.

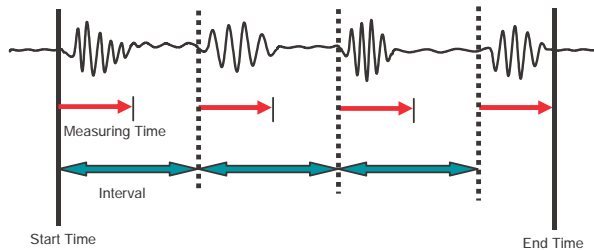
## Simple “ User Settings ”

Up to four user settings are available to save input and record conditions. Users can start measurement immediately without re-entering previous settings.



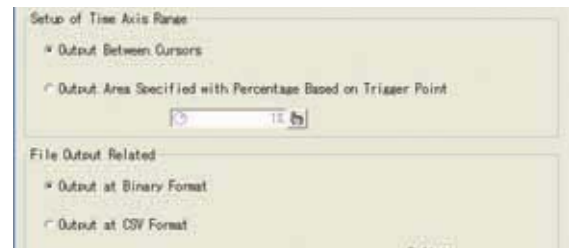
## Timer-control Function

Automatic measurement with preset time and interval.



## CSV File Conversion: Supports for Analysis

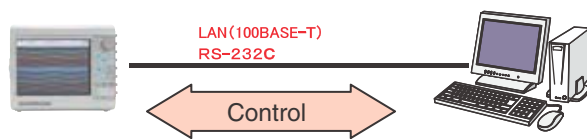
RA2300 can convert measured data into CSV file for analysis using Excel or other analysis software. It has functions like thinning out and batch conversions.



# Connection to PC and Other Peripheral Devices

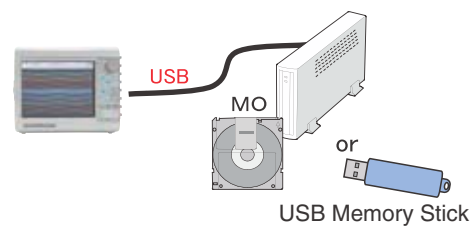
## Connection to PC

Users can control RA2300 from PC via LAN or RS-232C. Waveforms can also be monitored at PC using an optional software(NS2100).



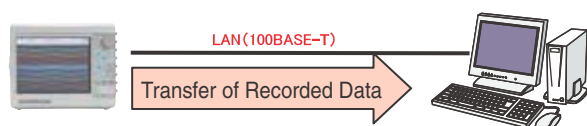
## Saving Large Data on External Devices

RA2300 has two USB ports as standard. Measured data can be saved on external storage devices via USB.



## File Sharing with PC

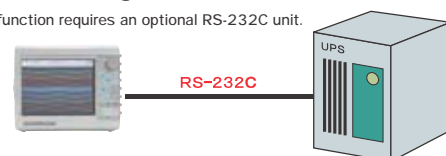
File sharing with PC is possible by transferring recorded data to PC via LAN.



## Automatic Shutdown at Blackout

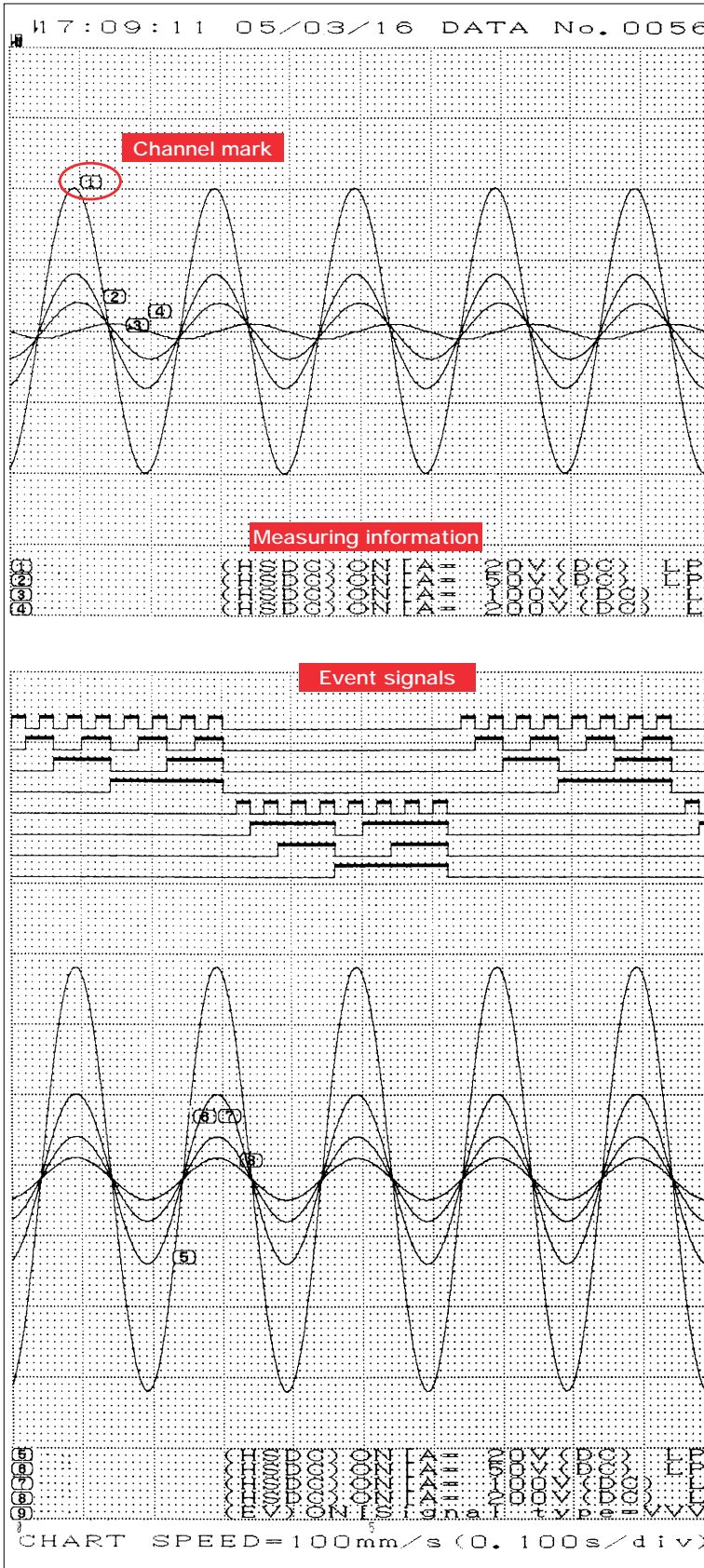
By connecting to uninterruptible power supply(UPS), RA2300 will be automatically shut down at blackout. If power failure occurs during long-term measuring, RA2300 will receive a signal from UPS and power itself off after regular shutdown.

\*\*\*This function requires an optional RS-232C unit.



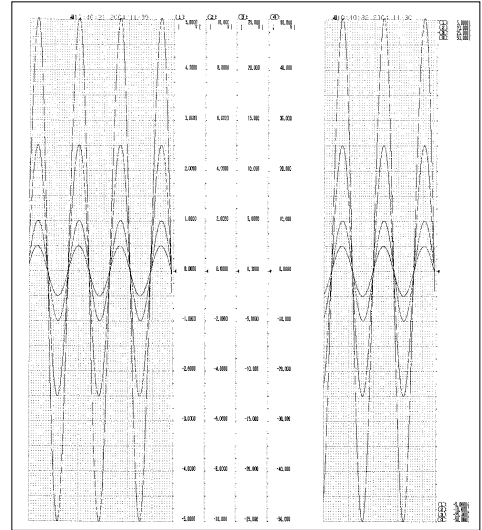
# High Speed & High Resolution Recording

- High speed(100mm/s) and high resolution(80 dots/mm at 25mm/s) recording is available.
- Customizable waveform division & printing size.
- Location and amplitude of digital signals can be changed by 8 channels each.



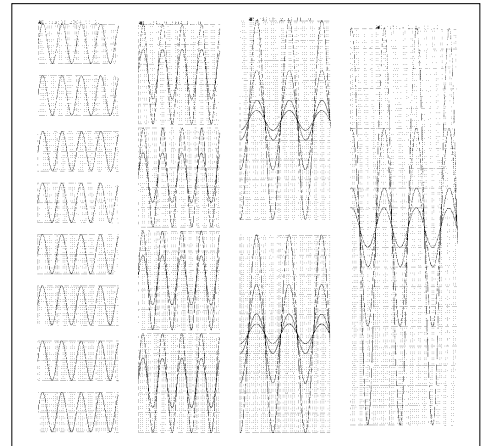
## Auto Scaling

Scales can be printed before or after waveforms.



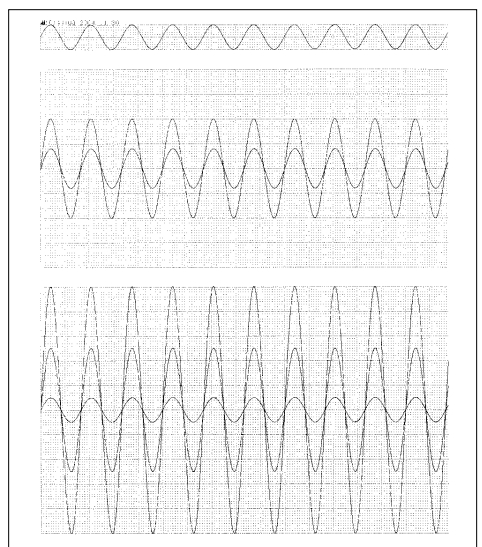
## Waveform Division

One to sixteen divisions can be selected to display or print out.

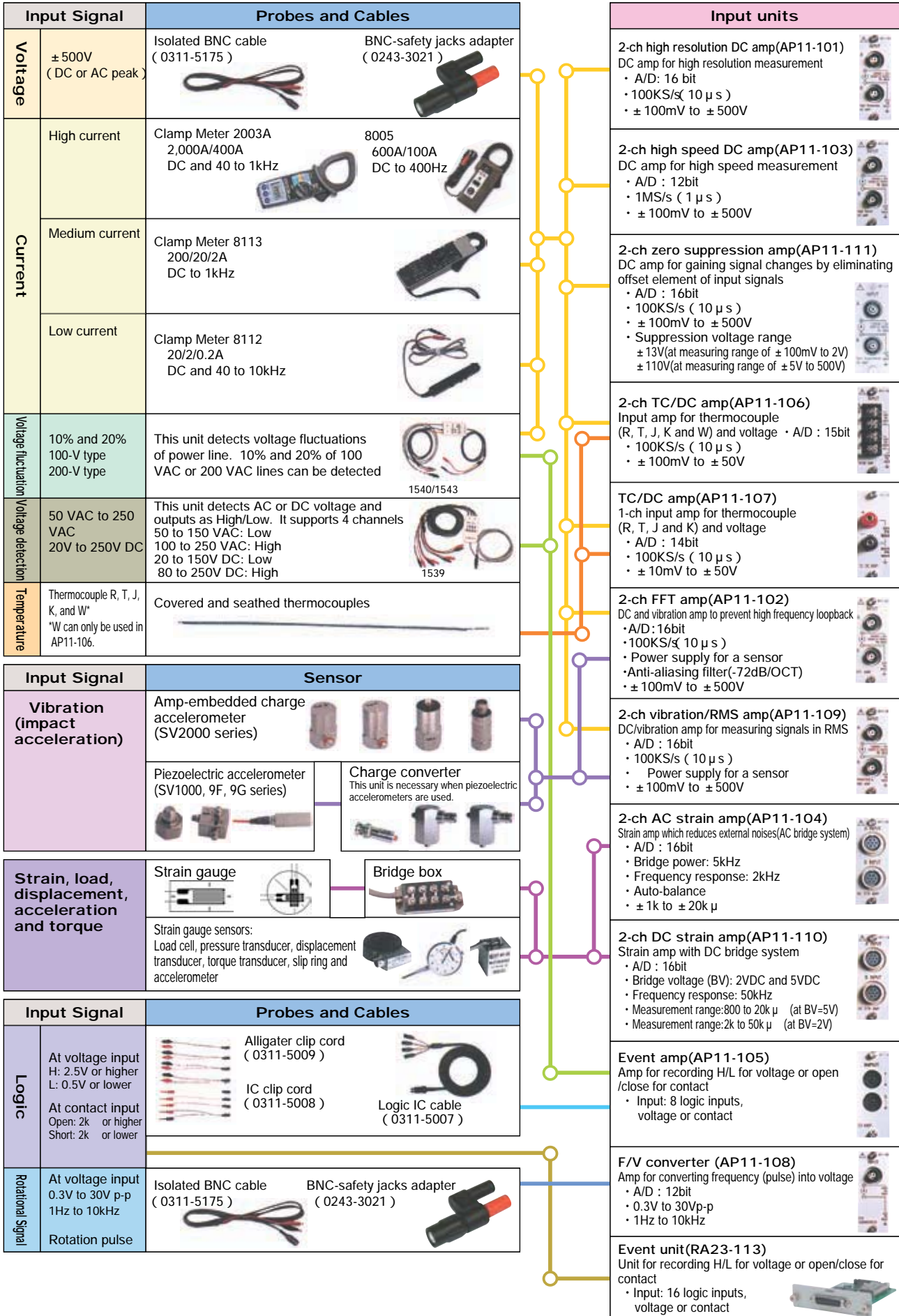


## Customizable Width Size

Users can print waveforms at selected width(10mm to 200mm).



# Input Unit Selection Block Diagram





# Basic Specifications

## Basic Specifications

Display	12.1-inch TFT color LCD Effective screen area: 245.76mmx184.32mm(1024x768 pixels)
Channel	16ch(8 slots) + digital input 16ch(optional)
Sampling Speed	MAX 1 $\mu$ s $\leq$ 1MS / s )
Printer	
Printing Method	Thermal printing using a thermal head
Paper Width	219.5mm
Effective Recording Width	1 division(200mm $\cdot$ FS) to 16 divisions(10mm $\cdot$ FS), number of division and printing width can be changed.
Channel Discrimination	Prints channel number in the vicinity of the printed waveform.The ON/OFF function is available.
Grid Pattern	Standard(10mm, 5mm), 10mm, 5mm, no grid
Battery Backup	Clock, setting value: approx 3 to 5 years(using a primary battery)
Storage Device	40GB Hard Disk Drive (HDD) MO drive or USB memory by USB connection
Interface	LAN(10/100BASE-T), USB: standard RS-232C, Remote terminal: optional
Operating Environment	Temperature: 5 to 40 Humidity: 35 to 80%RH(without condensation)
Power Supply	90 to 264VAC, frequency 50 to 60Hz
Power Consumption	100VA(typical): with AP11-101 x 8 units *1
Dimensions	Approx 369.5(W) x 150.5(H) x 301(D) mm(excluding projections)
Weight	8.0 kg or less(main body only) 8.7 kg or less(main body with AP11-101 x 4 units)

\*1 Power supply: 100V AC, paper feeding speed: 20mm/s, input signal: 10Hz

## Communication & Storage Specifications

HDD	
Function	Setting conditions of main unit and save/readout of measured data
Capacity	40GB(system domain 5GB + data storage space 35GB)
LAN	
Function	Control with communication command, Windows and file sharing with Windows PC
Standard	10/100BASE - T
USB	
Function	Data saving on storage device by USB connection
Standard	1.1
Available storage Device	MO, USB memory, HD **Products specified by NEC San-ei only

## Trigger Specifications

Trigger Mode	OR, AND, WINDOW, OFF
Trigger Source	Input signal, manual trigger, external trigger
Trigger Settings	Amps other than event amp Trigger slope: OR, AND...or WINDOW...OUT or IN Level setting: to be set with physical values(e.g. voltage) Event unit(optional), event amp(AP11-105) State settings: H, L, or OFF can be set for each input. (w/o trigger slope). When Off is set, trigger condition is not applied. Trigger setting: AND or OR of state setting conditions of inputs from 1 to 8
Trigger Related Functions	
Trigger output	Output signal when trigger conditions are met(0 to 5V voltage signal active LOW: pulse width, approx 10ms)
Pre-trigger	Pre-trigger: 0 to 100%(1% step)
Trigger mark	Record trigger point with an arrow( ) and print year, date and time trigger occurred.
Trigger filter	1 to 65534 samples

## Measuring Mode(Acquisition/Recording) Specifications

Pen Recorder	
Waveform Printing	
Function	Printout input signal data on recording paper(waveform)
Measurement Starting Operation	Start with pressing start key, trigger detection or preset time. Interval recording available.
Paper Speed	100mm/s to 1mm/min(user setting, external synchronization enabled)
Frequency Response	DC to 100kHz(sampling: 10 points/cycle). Varies by input units.
Printing Density	Voltage axis: 8 dots/mm Time axis: 80 dots/mm(at 25mm/s)
Printing Length	Continuous
Data Backup	N/A

## HD Recorder

Data Recording	
Function	Real-time recording of measured data on HDD
Recordable Size	35GB max
Sampling Speed	1 $\mu$ s(w/ 1CH), 5 $\mu$ s(w/ 8CH), 10 $\mu$ s(w/ 16CH) max
Recording Method	Normal or ring recording(repeated recording during preset time) selectable.
Waveform Printing	
Function	Printout input signal data on recording paper(waveform)
Measurement Starting Operation	ON/OFF of printout to recording paper while HD recording
Paper Speed	100mm/s to 1mm/min(user setting, external synchronization enabled)
Frequency Response	DC to 100kHz(sampling: 10 points/cycle). Varies by input units.
Printing Density	Voltage axis: 8 dots/mm Time axis: 80 dots/mm(at 25mm/s)
Printing Length	Continuous

## Memory Recorder

Data Recording	
Function	Record measured data on memory in main unit.
Measurement Operation	Once, repeat, and endless
Memory Capacity	32MW when using 16 channels, 2MW/ch
Memory Division	1, 2, 4, 8, 16, 32, 64 and 128 divisions
Sampling Speed	1 $\mu$ s(1MS/s) to 100s(1S/s), user setting, external synchronization enabled
Waveform Recording	
Function	Printout memory data on recording paper(waveform)
Printing Density	Voltage axis: 8 dots/mm, time axis: 10 dots/mm
Copy Magnification	x5 to x1/1000
Memory Filing	Data is saved on the memory device in binary or CSV format every time when it is stored in memories.
Data Backup	Memory backup with HDD(data saved in a specified area of HDD at shutdown)
Save/Copy Area	Copy with trigger at center: 1 to 100%(1% step), copy between two cursors.

## Multi Recorder

Function	Steady-state and transient events can be recorded simultaneously on HD, memory and/or recording paper
Pen Recorder	Refer to Pen Recorder spec
HD Recorder	Refer to HD Recorder spec
Memory Recorder	Refer to Memory Recorder spec(waveform printing not available)

## X-Y Recorder

Function	ON/OFF of locus enabled(pen up & down) Input signal monitor, freeze, copy and X-Y display during data recording available.
Axis Setting	X-axis: 1 channel, Y-axis: 3 channels
Measuring Speed	1ms to 1s
Data Recording	
Function	Record all input signals(if input channel is ON at amp setting display) on HDD.
Recordable Size	35GB max
Recording Method	Standard
Waveform Printing(Printout)	
Function	Printout displayed waveforms(X-axis: 1ch, Y-axis: 3ch) at A4 size
Resolution	1600x1600 dots(at printout), 650x650 dots(at display)

## Measured Data Display (Replay Monitor) Specifications

Function	Display recorded data at X-T or X-Y when pressed "Replay" button on operation panel.
Available Measuring Mode	All(relevant to actual measuring mode)
Y-T Display	
Waveform Division	1 to 16 divisions
Display Magnification	x100 to x1/10,000
Thumbnail Function	Display whole data of selected one channel on a thumbnail bar
Numeric Display	Numeric value, cursor value, numeric + cursor values(by switching over)
Search Function	Search by cursor, time, address, max/min and event
X-Y Display	
Channels Allowed	up to 1ch/X-axis and 3ch/Y-axis can be displayed (to be selected by user).
Data Output	On file and printing paper
Output File Format	Binary or CSV data

## Other Specifications

Printer	
Data Information	Measuring mode, year/month/day, measurement start time, data No., trigger conditions(trigger point, trigger date, trigger time), sampling speed, paper speed, time axis can be printed with waveforms. ON/OFF selectable.
Channel Information	Print input unit settings when saved ON/OFF selectable.
Mark Print	Pen-recorder, HD-recorder, mark(date/time) print
List Print	Printout of setting condition (sampling speed, detailed amp settings, etc.) available
Screen Copy	Print screen image on recording paper
Line Width for Printing	Select base line boldness for each channel(1, 2, 3, or 4 dots)
Auto Function	
Function	Sampling speed and input range can be set automatically by using "auto" button on operation panel.
Sampling Speed	Adjust sampling speed of an active channel with smallest number (1 to 16ch).
Input Range	Rough-tuning of all active channels
Timer Function	Start time, end time and interval can be set.
CSV Conversion	Available(also batch conversion of multiple memories or files)
Screen Image Saving	Save screen image on HDD at BMP format(colored)
Save/Readout of Settings	Save up to 4 settings (input and main unit setting conditions) on the main unit HDD.
Keylock Function	Void key input to prevent operational error (password protected)
Physical Value Conversion	Physical conversion of input signals, full scale change on display, registration of units
Waveform Display of Event Input	Display position of event amp and event unit(optional) can be changed. Set reference position and pitch per 8 channels.

## Optional Unit

Remote Unit (RA23-112)	
Function	Start, stop, mark print, paper feed is possible by the external signal. Synchronization pulse input. Output error signal, input UPS protect signal
Cables	1.5m, I/O connector 28-pin and open wire
Weight	60g or less

## Event Unit (RA23-113)

Function	Input logic signal directly into main unit (independent from other amps).
Number of Signals	16
Signal Level	0 to 5V, voltage input(no contact)
Cables	1.5m, I/O connector 34-pin and open wire
Weight	60g or less

## RS-232C Unit (RA23-114)

Standard	JIS X5101(former C6351) complied
Transfer Speed	38400, 19200, 9600, 4800 or 2400bps
Connector	D-sub 9-pin connector
Function	
Shutdown	Shutdown operation when using UPS
Remote Control	Remote control from PC via RS-232C cable
Weight	50g or less

## AC Bridge Power Supply Unit (RA23-116)

Function	Bridge power source for 2-ch AC strain amp
Power Voltage, Carrier Wave	2Vrms, sine wave 5kHz
Synchronization	Synchronization with other RA2300s using built-in AC bridge power units is available.
Weight	60g or less

# Input Unit Specifications

## 2-CH High Resolution Amp(AP11-101) & 2-CH High Speed Amp(AP11-103)

Input	2 chs/unit, isolated unbalanced input, isolated BNC connector
Input Coupling	AC and DC coupling
Input Impedance	1M or higher
Measurement Range	±0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500V FS
Range Accuracy	AP11-101: within ±0.3% FS(within ±0.8% FS at ±500V) AP11-103: within ±0.5% FS(within ±0.8% FS at ±500V)
Offset Accuracy	AP11-101: within ±0.3% FS(at 25 ) AP11-103: within ±0.5% FS
Linearity	AP11-101: within ±0.1% FS(at 25 ) AP11-103: within ±0.2% FS
Allowable Input Voltage	Range of ±10V to 500V: ±500V max(DC or AC peak values) Range of ±0.1V to 5V: ±100V max(DC or AC peak values)
CMV	Unit only: 42V (DC or AC peak values) When using isolated BNC cable(optional): 300VAC
Frequency Response	AP11-101/at DC coupling: DC to 50kHz(+0.5, -3dB) at AC coupling: 0.3 to 50kHz(+0.5, -3dB) AP11-103/at DC coupling: DC to 400kHz(+0.5, -3dB) at AC coupling: 0.3 to 400kHz(+0.5, -3dB)
Low-pass Filter	AP11-101/bessel type(attenuation factor: -12dB/OCT) 30, 300, 3kHz, OFF(+0.5, -3dB) AP11-103/bessel type(attenuation factor: -12dB/OCT) 5, 50, 500, 5k, 50kHz, OFF(+0.5, -3dB)
A/D Converter	AP11-101: 16-bit, 100kHz max(simultaneous 2-ch sampling) AP11-103: 12-bit, 1MHz max(simultaneous 2-ch sampling)
Temperature Stability	AP11-101/zero point: within ±0.02% FS/ AP11-103/zero point: within ±0.03% FS/
Gain(Range)	within ±0.01% FS/
Weight	AP11-101: approx 230g or less, AP11-103: approx 240g or less

## 2-CH TC/DC Amp(AP11-106) & TC/DC Amp(AP11-107)

Input	AP11-106: 2 chs/unit, isolated unbalanced input, terminal block M4 AP11-107: 1 ch/unit, isolated unbalanced input, 2 binding posts
Input Coupling	DC coupling
Input Impedance	10M or higher(approx 1M at 5, 10, 20, 50VFS in DC range)
Thermocouple	AP11-106: R, T, J, K, W AP11-107: R, T, J, K
Measurement Range(Temperature)	AP11-106 AP11-107
R:	0 to 1600 FS 800 FS(0 to 800 ), 1600 FS(0 to 1600 )
T:	-200 to 400 FS 200 FS(-200 to 200 ), 400 FS(-200 to 400 )
J:	-200 to 1000 FS 200 FS(-200 to 200 ), 1000 FS(-200 to 1000 )
K:	-200 to 1350 FS 200 FS(-200 to 200 ), 1200 FS(-200 to 1200 )
W:	0 to 2300 FS N/A
Measurement Range(Voltage)	AP11-106: 100, 200, 500mV, 1, 2, 5, 10, 20, 50V FS AP11-107: 10, 20, 50, 100, 200, 500mV, 1, 2, 5, 10, 20, 50V FS
Range Accuracy	Temperature: ±0.5% FS(within ±1% at 0 or lower) Voltage: ±0.5% FS
Cold Junction Compensation	Internal/external switchable. Accuracy: within ±2 (within ±1 at stable temperature of 20 at input terminal)
Linearity	Within ±0.1% FS
Allowable Input Voltage	50V (DC or AC peak values)
CMV	AP11-106: 42V(DC or AC peak values) AP11-107: 300V(DC or AC peak values)
Frequency Response	DC to 40kHz(+0.5, -3dB)
Low-pass Filter	Bessel type(attenuation factor: -18dB/OCT) 1, 30, 500, 5kHz, OFF(+0.5, -3dB)
A/D Converter	AP11-106: 15-bit, 100kHz max(simultaneous 2-ch sampling) AP11-107: 14-bit, 100kHz max
Temperature Stability	When used as temp amp/gain(range): within ±0.04% FS/ When used as DC amp/zero point: within ±0.03% FS/ gain(range): within ±0.01% FS/
Weight	AP11-106: 240g or less, AP11-107: 200g or less

## 2-CH AC Strain Amp(AP11-104) & 2-CH DC Strain Amp(AP11-110)

Input	2 chs/unit, isolated unbalanced input, isolated NDIS connector
Input Coupling	AP11-104: balanced input(isolation: between channels inside unit or between each channel and chassis) AP11-110: DC
Input Impedance	10M +10M or higher (AP11-110 only)
Bridge Power Supply	AP11-104: sine wave 2Vrms, 5kHz(AC bridge power supply RA23-116 required) AP11-110: 2V, 5V
Applicable Gauge Resistance	AP11-104: 120 to 1k AP11-110: 120 to 2k (at BV=2V), 350 to 2k (at BV=5V)
Gauge Factor	AP11-104: 1.9 to 2.2 AP11-110: 2.0
Range of Balance	AP11-104/resistance: ±2%(10000 μ ) or lower capacitance: 2000pF or lower AP11-110/±3%(15000x10-6 μ ) or lower
Balance Method	AP11-104 AP11-110
Resistance	Auto-balance Auto-balance
Capacitance	Auto-balance(500pF or lower eliminated) N/A
Balance Time	Within 1s at 1 channel Within 0.5s at 1 channel
Remained Voltage Accuracy	Within ±0.5% FS Within 0.3% FS
Max Sensitivity(AP11-104)	Over full scale at 500 μ (at bridge voltage of 2V or higher)
Measurement Range	AP11-104 AP11-110
Strain	1k, 2k, 5k, 10k, 20k μ ·FS 2k, 5k, 10k, 20k, 50k μ ·FS(at BV=2V) 800, 2k, 4k, 8k, 20k μ ·FS(at BV=5V)
Voltage	N/A 2, 5, 10, 20, 50mV FS
Accuracy	Within 0.3% FS(AP11-110 only)
Internal Calibrator and Accuracy	±0.5k, 1k, 2k, 3k, 5k μ Accuracy: within ±0.5% FS (AP11-104 only)
Linearity	AP11-104: ±0.2% FS, AP11-110: ±0.1% FS
CMV	300VAC
Allowable Input Voltage	±8V(DC or AC peak value)
Frequency Response	AP11-104: DC to 2kHz(+1, -3dB) AP11-110: DC to 50kHz(+0.5, -3dB)
Low-pass Filter	AP11-104: butlerworth type(attenuation factor: -12dB/OCT) 10, 30, 100, 300Hz and OFF(+1, -3dB) AP11-110: bessel type(attenuation factor: -12dB/OCT) 10, 30, 100, 300Hz and OFF(+1, -3dB)
A/D Converter	16 bits, 100kHz max
Temperature Stability	Zero point: within ±0.05% FS/ (AP11-104), within ±0.1% FS/ (AP11-110) Gain(range): within ±0.05% FS/ (AP11-104), within ±0.01% FS/ (AP11-110)
Weight	285g or less(AP11-104), 240g or less(AP11-110)

## Event Amp(AP11-105)

Input	8 channels/unit
Input Type	Common ground in unit, case-free
Input Signals	Sets voltage or contact for each channel Voltage input: input voltage range 0 to +24V detection level: H level 2.5V or higher L level 0.5V or lower Contact input: open 2k or higher, close 250 or lower
Response Time	Within 1 μ s (at input "M", level +5V or higher)
Input Connector	Logic IC cord(0311-5007) x 2; alligator clip cord(0311x5009) x 2 IC clip cord(0311-5008) x 2
Weight	100g or less

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

Input	2 chs/unit, isolated unbalanced input, isolated BNC connector
Input Coupling	AC and DC coupling
Input Impedance	1M or higher
Power Supply for Sensor	2mA, 18V or higher
Measurement Range	0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500V
Accuracy	Within ±0.3% FS(within ±0.8% FS at ±500V)
RMS	Within ±2% FS(at DC and 40Hz to 20kHz)
Linearity	within ±0.1% FS
Crest Factor	2.8 max(when used as RMS amp)
CMV	Unit only: 42V (DC or AC peak values)
Frequency Response	DC coupling: DC to 50kHz(+1, -3dB) AC coupling: 1 to 50kHz(+1, -3dB)
Low-pass Filter	Butterworth type(attenuation factor: -24dB/OCT) 30, 100, 300Hz, 1kHz and OFF
High-pass Filter	Butterworth type(attenuation factor: -24dB/OCT) 10, 30, 100Hz and OFF
A/D Converter	16-bit, 100kHz max
Temperature Stability	Zero point: within ±0.02% FS/ Gain(range): within ±0.01% FS/
Weight	270g or less

## 2-CH FFT Amp(AP11-102)

Input	2 chs/unit, isolated unbalanced input, isolated BNC connector
Input Coupling	AC and DC coupling(only AC coupling when connected with amp-embedded piezoelectric accelerometer)
Input Impedance	1M or higher
Power Supply for Sensor	2mA, +18V or higher
Measurement Range	±0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500V FS
Range Accuracy	Within ±0.3% FS(within ±0.8% FS at ±500V)
Linearity	within ±0.1% FS
Allowable Input Voltage	±500V (DC or AC peak values) (±30V at AC coupling in ±0.1 to 5V range)
CMV	Unit only: 42V (DC or AC peak values) When using isolated BNC cable(optional): 300VAC
Frequency Response	DC coupling: DC to 50kHz(+0.5, -3dB) AC coupling: 0.3 to 50kHz(+0.5, -3dB)
Low-pass Filter	Bessel type(attenuation factor: -12dB/OCT) 30, 300, 3kHz, OFF(+0.5, -3dB)
Anti-aliasing Filter	20, 40, 80, 200, 400, 800Hz, 2, 4, 8, 20, 40kHz Drop characteristics: -72dB/OCT at 1.5 x fc
Offset Accuracy	within ±0.3% FS(at 25 )
A/D Converter	16-bit, 100kHz max
Temperature Stability	Zero point: within ±0.02% FS/ Gain(range): within ±0.01% FS/
Weight	240g or less

## F/V Converter(AP11-108)

Input	1 ch/unit, isolated unbalanced input, BNC connector
Input Coupling	AC and DC coupling
Input Impedance	100k or higher
Input Frequency Range	1Hz to 10kHz(pulse width: 20 μ s or longer)
Measurement Range	0.1, 0.2, 0.5, 1, 2, 5, 10kHz FS
Accuracy	Within ±0.5% FS
Linearity	Within ±0.3% FS
Trigger Level	Selectable from 0V or 2.5V
Allowable Input Voltage	±100V (DC or AC peak values)
CMV	Unit only: 42V (DC or AC peak values), when using isolated BNC cable (optional): 300VAC
Response Time	Approx 20ms(at the range of 10kHz)
A/D Converter	16-bit, 100kHz max
Temperature Stability	Zero point: within ±0.03% FS/ Gain(range): within ±0.02% FS/
Weight	125g or less

## 2-CH Zero Suppression Amp(AP11-111)

Input	2 chs/unit, isolated unbalanced input, isolated BNC connector
Input Coupling	AC and DC coupling(max allowable input ±30V at AC coupling for measurement range ±0.1 to 2V)
Input Impedance	1M or higher
Measurement Range	±0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500V FS
Range Accuracy	Within ±0.5% FS(within ±0.8% FS at ±500V FS)
Offset Accuracy	within ±0.5% FS
Linearity	within ±0.2% FS
Allowable Input Voltage	range of ±5V to ±500V: ±500V max(DC or AC peak value) range of ±0.1V to ±2V: ±100V max(DC or AC peak value)
CMV	42V (DC or AC peak values) When using isolated BNC cable(optional): 300VAC
Frequency Response	At DC coupling: DC to 5kHz(+0.5, -3dB) At AC coupling: 0.3 to 5kHz(+0.5, -3dB)
Low-pass Filter	Bessel type(attenuation factor: -12dB/OCT) 30, 300, 3kHz, OFF(+0.5, -3dB)
Suppression Voltage	±13V at ±0.1, 0.2, 0.5, 1 and 2V range ±110V at ±5, 10, 20, 50, 100, 200, 500V range Resolution: 500 μ V or less at ±0.1, 0.2, 0.5, 1 and 2V range 5mV or less at ±5, 10, 20, 50, 100, 200, 500V range Accuracy: within ±0.5% (at suppression voltage +13V max) Temp Stability: ±0.005% (at suppression voltage +13V max)
Auto Zero Suppression	Recognize current input voltage and suppress the voltage automatically. Time: within 1 sec Remain voltage: within ±(resolution of suppression voltage x 10)V
A/D Converter	16-bit, 100kHz max(simultaneous sampling of 2chs)
Temperature Stability	Zero point: within ±0.03% FS/ Gain(range): within ±0.01% FS/
Weight	260g or less

## Charge Converter(AP11-901, AP11-902, AP11-903)

Gain	1.0mV/pC ±5%(AP11-901, AP11-902), 0.1mV/pC ±5%(AP11-903)
Max Input Charge	5000pC(AP11-901, AP11-902), 5000pC(AP11-903)
Frequency Range	Approx 1.6Hz to 50Hz
Max Output Voltage	5Vp-p or lower
Drive Voltage	12 to 25 VDC
Drive Current	0.5 to 5mA
Rated Noise	20 μ Vrms or lower
Phase	180 °
Operating Temperature	-20 to 80 (AP11-901), -20 to 110 (AP11-902, AP11-903)
Connector	Input: miniature connector(10-32UNF) Output: male BNC terminal(AP11-901) female BNC connector(AP11-902, AP11-903)
Weight	20g or less(AP11-901), 65g or less(AP11-902, AP11-903)

# Main Unit & Accessories

Main Unit	Item	Model	Rating
	Main Unit <sup>1</sup>	Omniace	RA2300
	Standard Accessories	AC power cable(w/adaptor) x1, recording paper x1, paper holder x1, input unit slot cover plate x1 set and user's manual x1	

<sup>1</sup> Input units are not included.

Input Unit	Item	Model	Rating	
	Input Unit	2-ch High Resolution DC Amp	AP11-101	Input: $\pm 100\text{mV}$ to $\pm 500\text{V}$ , A/D resolution: 16-bit, sampling: 10 $\mu\text{s}$
		2-ch High Speed DC Amp	AP11-103	Input: $\pm 100\text{mV}$ to $\pm 500\text{V}$ , A/D resolution: 12-bit, sampling: 1 $\mu\text{s}$
		2-ch Zero Suppression Amp	AP11-111	Input: $\pm 100\text{mV}$ to $\pm 500\text{V}$ , A/D resolution: 16-bit, sampling: 10 $\mu\text{s}$
		2-ch FFT Amp	AP11-102	Anti-aliasing filter: 72dB/OCT, with power supply for sensor
		Event Amp	AP11-105	Input: 8 logics(voltage/contact)
		2-ch TC/DC Amp	AP11-106	Input: R, T, J, K, W ( $\pm 100\text{mV}$ to $\pm 500\text{V}$ ), A/D resolution: 15-bit
		TC/DC Amp	AP11-107	Input: R, T, J, K, ( $\pm 10\text{mV}$ to $\pm 50\text{V}$ ), A/D resolution: 14-bit
		2-ch AC Strain Amp <sup>2</sup>	AP11-104	Frequency response: 2kHz, bridge power supply: 5kHz
		2-ch DC Strain Amp	AP11-110	Input: 800 $\mu$ to 20k $\mu$ (BV=5V), 2k $\mu$ to 50k $\mu$ (BV=2V)
2-ch Vibration/RMS Amp		AP11-109	Input: $\pm 100\text{mV}$ to $\pm 500\text{V}$ , sampling: 10 $\mu\text{s}$ , power supply for sensor	
F/V Converter	AP11-108	Input: 1Hz to 10kHz		

<sup>2</sup> Optional AC bridge power unit(RA23-116) required.

Optional Unit	Item	Model	Rating	
	Interface	Remote Unit	RA23-112	w/ cable(1.5m, I/O connector 28-pin and open wire)
		Event Unit	RA23-113	w/ cable(1.5m, I/O connector 28-pin and open wire)
		RS-232C Unit	RA23-114	
		AC Bridge Power Supply Unit	RA23-116	
	Hard Carrying Case(w/ Casters)	RA11-117		
	Soft Carrying Case	RT36-115		
	Dust Cover	RA11-121		
	Roll Paper Take-up	RT31-164		
	Z-fold Paper Storage Box	RA12-103	including Z-fold paper adaptor(RA12-301)	
	Z-fold Paper Adaptor	RA12-301		
	Mobile Cart	RA11-118		
	Charge Converter*3	AP11-901	1.0mV/pC, small type(connected to input amp),connectors(input: miniature connector, output: BNC male)	
		AP11-902	1.0mV/pC, connectors(input: miniature connector, output: BNC female)	
		AP11-903	0.1mV/pC, for high sensitivity sensors connectors(input: miniature connector, output: BNC female)	
	AC/DC Voltage Detector	1539	4 inputs	
	AC Voltage Level Detector	1540	1 input, 100VAC/120VAC	
		1543	1 input, 220VAC/240VAC	
		0311-5004	length: 1.5m, connectors: pin tip and banana plug	
	Voltage Output Cable	0311-5006	length: 1.4m, connectors: pin tip and pin tip jack	
	Digital Clamp Meter	2003A <sup>4</sup>	for high current(2000A, 400A/DC and 40 to 1kHz)	
	AC/DC Clamp Meter	8005 <sup>5</sup>	for high current(600A, 100A/DC to 400Hz)	
		8113 <sup>5</sup>	for medium current(200A, 20A, 2A/DC to 1kHz)	
	Clamp Meter	8112 <sup>5</sup>	for low current(20A, 2A, 0.2A/DC40 to 10kHz)	
	Signal Input Cable(for Clamp Meter Output)	0311-5184 <sup>6</sup>	length: 2m, small plug for microphone and isolated BNC	

<sup>3</sup> Required for using piezoelectric accelerometer with 2-ch vibration/RMS amp or 2-ch FFT amp.

<sup>4</sup> Use signal input cable(0311-5184) if connecting output from 2003A to RA2300.

<sup>5</sup> Use a BNC adaptor(0243-3021) if connecting output from 8005, 8112 and 8113 to RA2300.

<sup>6</sup> Cable for inputting output from 2003A to isolated BNC connector of RA2300.

Optional Unit	Item	Model	Rating
	Signal Input Cable	0311-5175	length: 2m, isolated BNC connector and alligator clip (+: red, -: black)
		0311-5200	length: 2m, isolated BNC connector and metal BNC
		0311-7155	length: 2m, isolated BNC connector and open wire
		0311-5158 <sup>7</sup>	length: 2m, S terminal and alligator clip(+: red, -: black)
		0311-5155 <sup>7</sup>	length: 2m, S terminal and open wire
		0311-5173 <sup>7</sup>	length: 2m, S terminal and BNC
		0311-5160 <sup>7</sup>	length: 2m, 2-banana and alligator clip(+: red, -: black)
		0311-5174 <sup>7</sup>	length: 2m, 2-banana and BNC
		0311-5177 <sup>7</sup>	length: 2m, safety-BNC and open wire
		AC Bridge Power Distribution Cable	0311-2057
	0311-5084		length: 2m, BNC connector and alligator clip(+: red, -: black), mold color: red
	47226		length: 2m, BNC connector and BNC connector
	Logic IC Cable	0311-5007	logic IC cord(1 pc)
		0311-5008	IC clip cord(4 pcs/set)
		0311-5009	alligator clip cord(4 pcs/set)
	Event Input Cable	0311-5001	1.5m, DIN8P and open wire
	Event Input Extension Cable	0311-5005	1.5m, DIN8P plug and DIN8P socket
	BNC Adaptor	0243-3021	Isolated BNC and S terminal plug
	BNC Adaptor(for distribution)	0243-2118	AC bridge power distribution
AC Power Cable	47326	length: 2.5m with adaptor	
DC Power Cable	0311-5167		

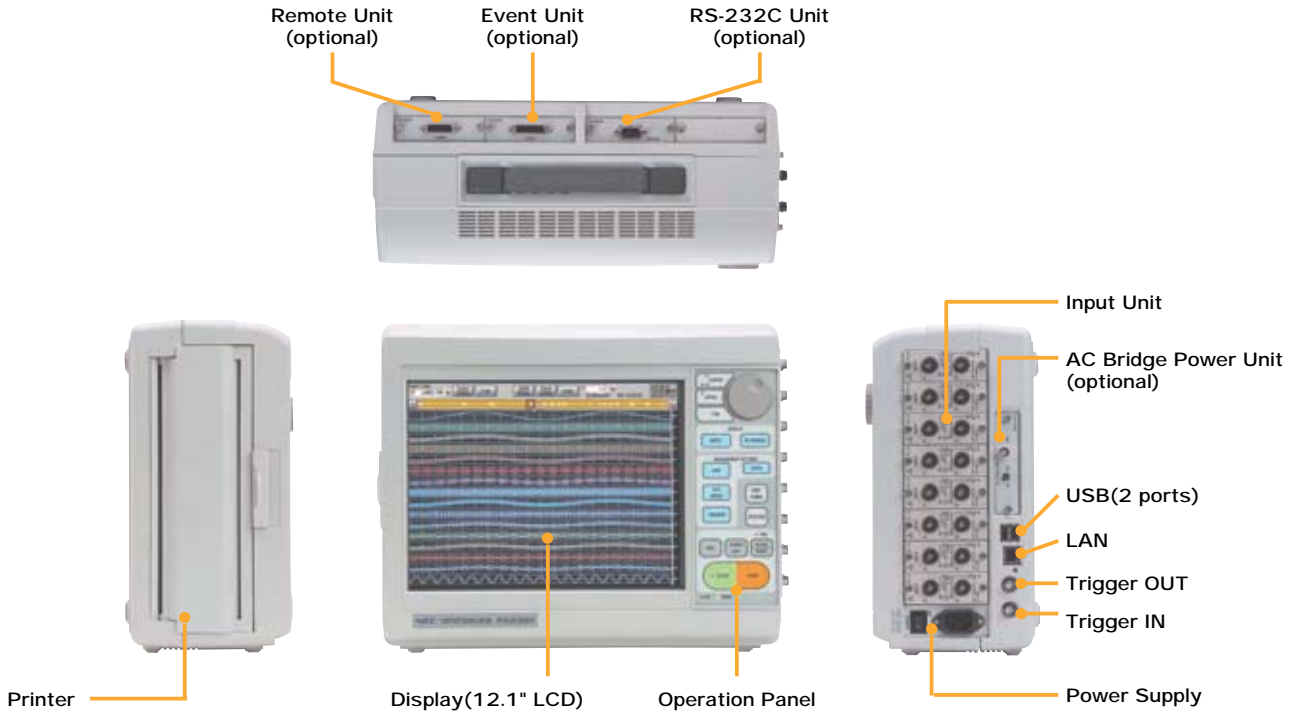
<sup>7</sup> BNC adaptor(0243-3021) required if connecting to input unit with isolated BNC terminal.

Recording Paper	Item	Model	Rating
	Recording Paper	YPS106	220x30m roll paper(5 rolls/box)
	Recording Paper(w/ perforated line)	YPS108	220x30m roll paper(5 rolls/box)
Recording Paper(Z-fold paper)	YPS112	220x201m Z-fold paper(1 set/box)	

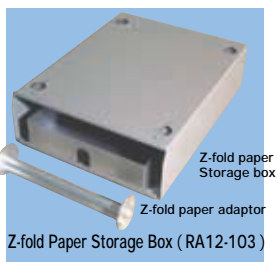
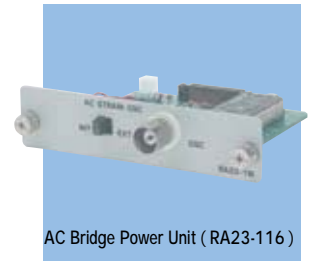
<sup>8</sup> Quality not assured if used papers other than above.

Software	Item	Model	Rating
	Omniviewer	NS2100	
Additional License(1 license)	NS2100-L01		

# Main Unit Appearance



# Option Unit Appearance



Please read "WARNING" & "CAUTION" in the operation manual attached to the product carefully for proper operation before using the product.