## **DATA ACQUISITION SYSTEM**

# omniace III RA2300A / RA2800A



"Measurement by Anybody, at Any Field and Any Time!!"

The New-Generation Omniace



NIPPON AVIONICS CO.,LTD.

An NEC Group Company

# Easy Data Recording at Various Fields!!

# Long-term Recording on Built-in HDD!!





RA2300A

RA2800A

The RA2300A/RA2800A Omniace II is a data acquisition device that enables you to acquire/record data with simple operation. Reduced condition setting time and easy measurement can be realized by virtual amplifier setup, a touch-panel and dynamic waveform display on a large LCD. The RA2300A/RA2800A features with various measuring modes such as HD Recorder (for long-term recording on a 40GB HDD) or Memory Recorder (for fast-speed event recording). The RA2300A/RA2800A will bring you success in many measuring opportunities such as production line, quality inspection and R&D.

Direct sensor inputs up to 32 channels (16 slots) are available for RA2800A and 16 digital input channels measure diverse signal timing and contact status.

## **FEATURES**

#### Easy pen recorder mode

Easy operation of the "pen recorder" was realized by virtual amp. setup display and touch panel.

Easy measurement of a "pen recorder" is yours without complicated settings.

#### Various features at playback mode

Various search functions are available for finding certain points in large data easily after long-term recording. Fast search using a thumbnail bar (displays all recorded data of selected one channel) and jump search(max/min, time, etc.) available.

#### Direct input from sensors

Signals from various sensors can be input directly using 11 amplifiers(voltage, strain, temperature, vibration, pressure, rotation pulses, etc.)

#### Display input waveform on a large screen

A large 12.1" LCD for better visibility of measured data. Horizontal and vertical waveform scroll is selectable for RA2800A and this function increases visibility.

#### Long-term HDD recording

Long-term & high speed data recording by a built-in 40GB HDD(data capacity of 120 days when using 16 channels with 10ms sampling speed).

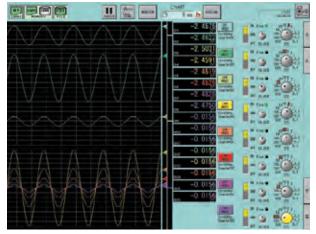
#### Standard LAN & USB ports

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

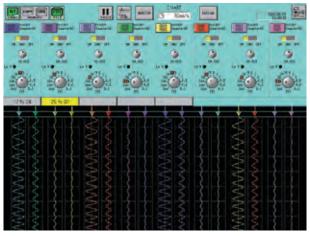
## Supporting Measurement at Various Fields(Operation & Displays)

#### Dynamic waveform display

This system has large 12.1 inch LCD and shows dynamic waveforms. Displaying number and dividing waveforms are voluntarily settable so that various waveforms to every application are available.



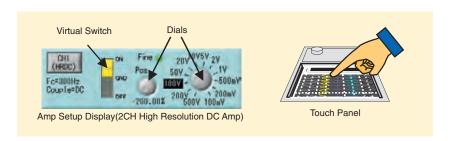
RA2300A Numerical value + amp setup display



RA2800A Image of divided waveforms and vertical scroll

#### Easy operation with rich features

Setup displays with virtual mechanical switch or jog dial allows users to understand input amplifier settings easily. By using both 12.1" large LCD and the touch panel, measuring conditions can be modified while monitoring waveforms at the large display. The input amplifier can also be automatically tuned by "auto" button on actual operational panel.





Operation Panel

## Direct input from sensors

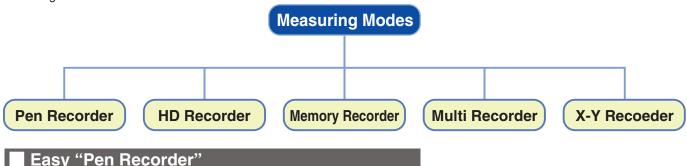


11 types of AP amplifiers including voltage, temperature, strain, vibration and frequency ( pulse )are available and they enable every signal to direct input.

Item	Model No	Sampling	Resolution	Description
2-ch High Resolution DC Amp	AP11-101	10µs	16-bit	DC amp for high resolution measurement
2-ch High Speed DC Amp	AP11-103	1μs RA2300/2μs RA2800	12-bit	DC amp for high speed measurement
2-ch Zero Suppression Amp	AP11-111	10µs	16-bit	DC amp for gaining signal changes by eliminating offset element of input signals
2-ch FFT Amp	AP11-102	10µs	16-bit	DC and vibration amp to prevent high frequency loop-back
Event Amp	AP11-105	1μs RA2300/2μs RA2800	N/A	Amp for recording open/close for contact or H/L for voltage
2-ch TC/DC Amp	AP11-106A	10µs	15-bit	Input amp for thermocouple(R, T, J, K and W) and voltage
TC/DC Amp	AP11-107	10µs	14-bit	1-ch input amp for thermocouple(R, T, J and K) and voltage
2-ch AC Strain Amp	AP11-104A	10µs	16-bit	Strain amp which reduces influence of external noises(AC bridge system)
2-ch DC Strain Amp	AP11-110	10µs	16-bit	Strain amp with DC bridge system
2-ch Vibration/RMS Amp	AP11-109	10µs	16-bit	DC/vibration amp for measuring signals in RMS
F/V Converter	AP11-108	10µs	16-bit	Amp for converting frequency (pulse) into voltage

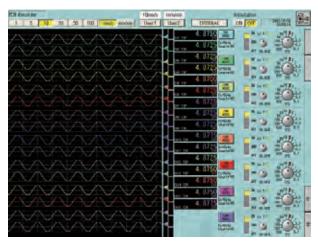
## **User Selectable Measuring Modes**

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.

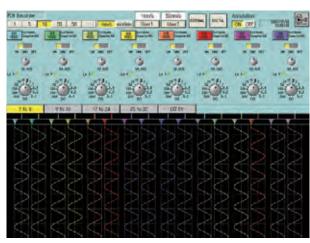


The "Pen Recorder" is a measuring mode with simple operation of pen recorders. The waveforms are displayed with "moving nib" images. Also, like pen recorders, amplifier and paper feeding speed\* can be setup on the touch panel.

\* RA2300A chart speed : 100mm/s ~1mm/min RA2800A chart speed : 50mm/s ~ 1mm/min



RA 2300A display sample



RA2800A vertical display sample

#### "HD Recorder": Best for Long-term Recording

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

Sample or peak style is selectable in recording. Peak style enables to have faster sampling data with max/min value than recording interval so that it can record data in slow recording interval.

#### Recordable Time on HardDisk<sup>2</sup>

Sampling	2 GB Capacity⁻⁵		35 GB Capacity			
Speed	w / 1 channel	w / 16 channels	w / 32 channels*4	w / 1 channel	w / 16 channels	w / 32 channels*4
*31µs	16.7 min	N/A	N/A	4.86 hrs	N/A	N/A
2µs	33.3 min	N/A	N/A	9.72 hrs	N/A	N/A
5µs	1.39 hrs	N/A	N/A	24.3 hrs	N/A	N/A
10µs	2.78 hrs	10.4 min	N/A	2.03 days	3.04 hrs	N/A
20µs	5.56 hrs	20.8 min	10.4 min	4.05 days	6.08 hrs	3.04 hrs
50µs	13.8 hrs	52.1 min	26.0 min	10.1 days	15.2 hrs	7.59 hrs
100µs	1.16 day	1.74 hrs	52.1 min	20.3 days	1.27 day	15.2 hrs
200µs	2.32 days	3.47 hrs	1.74 hrs	40.5 days	2.53 days	1.27 day
500µs	5.79 days	8.68 hrs	4.34 hrs	101 days	6.33 days	3.17 days
1 ms	11.6 days	17.4 hrs	8.68 hrs	203 days	12.7 days	6.33 days
2 ms	23.1 days	1.45 day	17.4 hrs	405] days	25.3 days	12.7 days
5 ms	57.9 days	3.62 days	1.81 day	1013 days	63.3 days	31.7 days
10 ms	116 days	7.23 days	3.62 days	2026 days	127 days	63.3 days

<sup>\*2</sup> It's a calculated value by integral number in sampling filing. Recording time will be half in peak filing.

<sup>\*1 5</sup>GB is occupied by system.

<sup>\*3</sup> Sampling speed 1µs is available for RA2300A only.

<sup>\*4 32</sup>ch is available for RA2800A only.

<sup>\*5</sup> Recording data is saved by every 2 GB for file protection.( in case recording data is set over 2GB)

#### "Memory Recorder": For Fast Event Recording

This mode is for recording fast events with internal memories<sup>-1</sup>. Unused memories can be utilized, so maximum of 32MW is available for memory recording if used only one channel. Measurements under various conditions are also possible by using many trigger functions.

\*1 RA2300A memory : fastest 1µs by 2MW/CH RA2800A memory : fastest 2µs by 1MW/CH

#### Trigger Mode

OR: ...... Activates if signal of ANY selected channel reaches

trigger level.

AND:..... Activates if signals of ALL selected channels reach

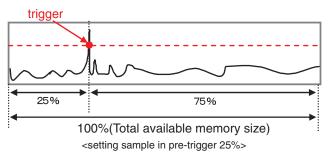
trigger level.

 $\label{eq:window} \mbox{WINDOW}:... \mbox{ Activates if signal of selected channel(s) reaches}$ 

preset level (IN) or gets out of it (OUT).

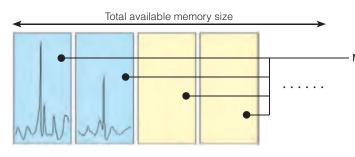
#### Pre-trigger Function

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.



#### Memory Block

As memory blocks are segmented, recording time is segmentalized and several recording functions are repeatable.



#### Recordable Time on Memories\*2

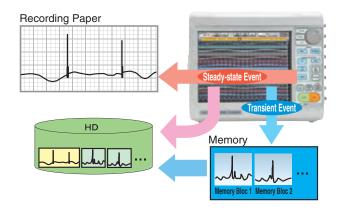
Sampling	w / 1 ch	w / 16 chs	w / 32 chs*4
Speed	(32 MW)	(2 MW / ch)	(1 MW / ch)
*31µs	33.6 sec	2.10 sec	N/A
2µs	1.12 min	4.19 sec	2.10 sec
5µs	2.80 min	10.5 sec	5.24 sec
10µs	5.59 min	21.0 sec	10.5 sec
20µs	11.2 min	41.9 sec	21.0 sec
50µs	28.0 min	1.75 min	52.4 sec
100µs	55.9 min	3.50 min	1.75 min
200µs	1.86 hrs	6.99 min	3.50 min
500µs	4.66 hrs	17.5 min	8.74 min
1 ms	9.32 hrs	35.0 min	17.5 min
2 ms	18.6 hrs	1.12 hrs	35.0 min
5 ms	1.94 day	2.91 hrs	1.46 hrs
10 ms	3.88 days	5.83 hrs	2.91 hrs
100 ms	38.8 days	58.3 hrs	29.1 hrs

- \*2 It's a calculated value by integral number in sampling filing. Recording time will be half in peak filing.
- \*3 Sampling speed 1µs is available for RA2300A only.
- \*4 32ch is available for RA2800A only.

Memory blocks are segmented by 1,2,4,8,16,32,64,128.

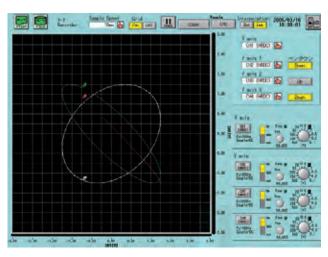
## "Multi Recorder": Records Steady-state & Transient Events Simultaneously

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



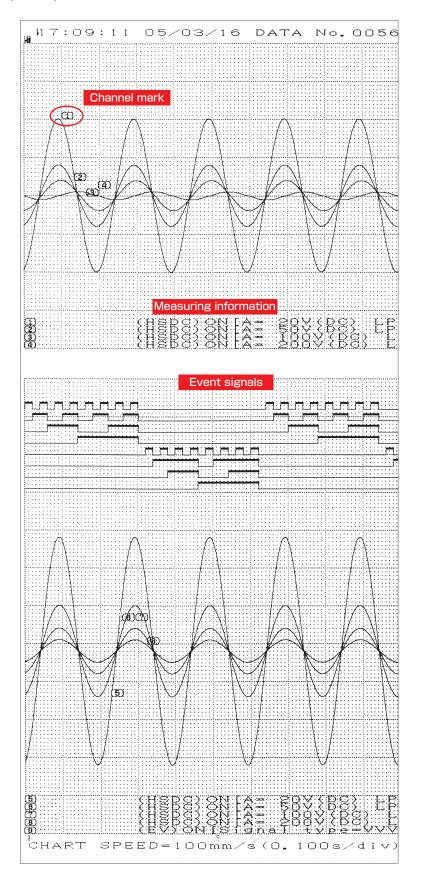
# "X-Y Recorder": Displays Correlation of Two Physical Values

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

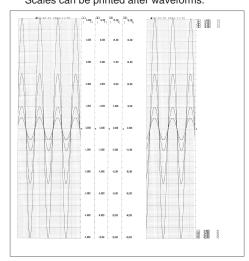


## **High Speed & High Resolution Recording**

- · High speed\* 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.
- \* Paper-feed speed of RA2300A is max 100mm/s and that of RA2800A is max 50mm/s.

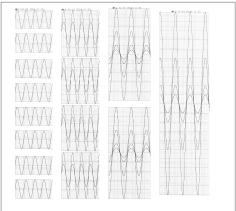


#### Auto Scaling Scales can be printed after waveforms.



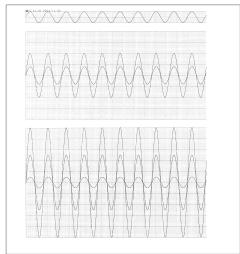
#### Waveform Division

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



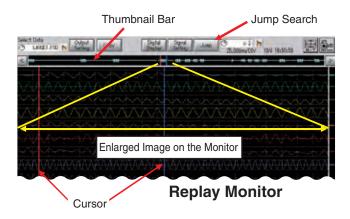
#### Customizable Width Size

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



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



#### Jump Search :

There are four jump search modes as followings.



Event...

Move to marked event



Address(Time)...

Move to elapsed time from start



■ Max/Min...

Move to max/min of recorded data



■ Time...
Move to specified time

## **Useful Fuctions**

## Saving Large Data on External Devices

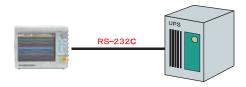
RA2300A/2800A has two USB ports as standard. Measured data can be seved on external storage devices via USB.



### Automatic Shutdown at Blackout

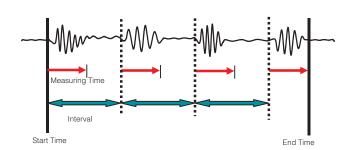
By connecting to uninterruptible power supply (UPS), RA2300A/2800A will be automatically shut down at blackout. If power failure occurs during long-term measuring, RA2300A/2800A will receive a signal from UPS and power itself off after regular shutdown.

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



#### ■ Timer-control Function

Automatic measurement with preset time and interval.



#### **CSV File**

RA2300A/2800A can convert measured data into CSV file for analysis

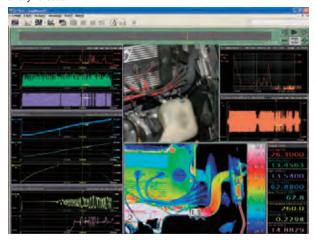
using Excel or other analysis software such as MATLAB, FAMOS and DIAdem. It has functions like thinning out and batch convertions.



## **Options and Utilities**

#### Remote Control by PC Software - Unifizer NS3000 Series

This PC application software enables the user to remotely program set-up configurations, record data, make arithmetic computations, and analyze data.



#### **♦** Remote Control Feature

Remotely control all RA series units via Ethernet. Control mainframe data acquisition functions, signal conditioning amplifiers, IR thermal imager and NEC-ATI approved A/D boards and visible light cameras.

#### ◆ Multiple Mathematic Operations and FFT Analysis

Math operations including Arithmetic/Trig/Log/Calculus functions and FFT real-time and post data collection analysis is included.

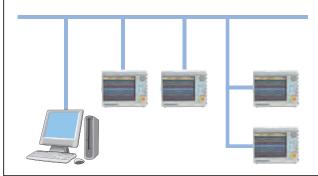
#### **◆** User Defined Monitor Display

Monitor display of Digital, Y-T & X-Y, and Bitmap data can be freely customized by user.

#### ◆ Report Generator and Simplified Print Feature

Comments and Cursors are easily added to the display monitor and printed

Up to eight (8) RA series units can be controlled by a single PC. The PC remotely controls measuring modes and data saving functions of each RA unit.

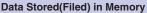


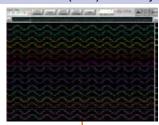
Images for reports can be easily prepared by printing added comments along with trace data and detected Max/Min and X/Y variation values.



#### Expanded Mathematic and FFT Analysis Software – Model RA23-751

The RA23-751 software computes math operations (arithmetic/trig/log/calculus and FFT analysis) on recorded channel data and displays the results in tabular, or waveforms in time axis and frequency form, and saves the results.





#### **Interval Statistical Function**

The Max/Min and P-P data values for each channel are detected, output and/or displayed in tabular form.

# Tabular Format Display CSV format

#### **Mathematic Functions**

Math operations between channels are calculated, output and/or displayed as Y-T waveforms.

#### Time Domain Display



#### **Binary or CSV formats**

#### **FFT Analysis**

Simultaneously perform any two (2) selected FFT analysis functions on channel data and display and/or output the data.

#### Frequency Domain Display

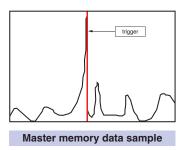


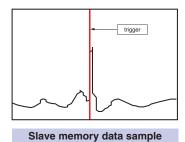
**Binary or CSV formats** 

#### Multiple Unit Synchronization – Model RA28-132 (Model RA2800A units only)

The Model RA28-132 Synchronization option allows multi-channel memory recording among multiple connected Model RA2800A units. Up to 10 units can be daisy chain connected to expand channel capacity to 320 channels. One unit is a master and the others are slaves. All recorded data is time synchronized with the sampling clock of the master unit.





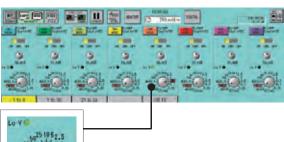


The high speed, multi-channel time synchronized data recorded by the RA2800A master and slave units is also simultaneously triggered. The trigger signal to simultaneously start and end memory recording in all units can be generated by either the master or any slave unit.

The Unifizer Model 3000 series remote control software is recommended for multi-unit synchronization applications.

#### DIV Sensitivity Unit - Model RA28-112

#### (Model RA2800A units only)



Recording electrical power signals and displaying the results in an electromagnetic oscillograph format is provided using the RA28-112 software. Simply set the recorder V/cm range sensitivity to AC220V/cm, AC100V/cm, or AC63.5V/cm range to display or print a true sine wave AC voltage amplitude at 1cm/p-p per channel.

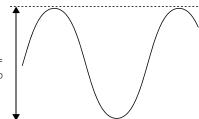


#### AC Voltage Level Detector 1540/1543

These external devices detect 100/120V & 220/240V voltage sags & surges exceeding selected 10% or 20% of AC peak value. A Model 1539 AC/DC Multi-Range Voltage Detector (not shown) that detects presence or absence of selected low or high voltages is helpful in determining system timing sequences. All detector outputs are ideal for use with all RA series recorder Event/Logic inputs.



1cm = Approx. 283Vp-p



Input = AC100V; Range = 100V/cm

#### Utility Software for General Data Display and Conversion - Model RA23-701

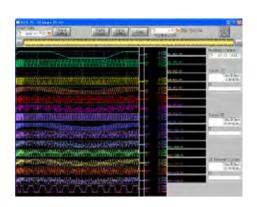
(Download this software free after completing User Registration)
Use the Model RA23-701 software to enhance PC viewing of data recorded on any
RA1000 or RA2000 series Data Acquisition Recorder.

#### Display of Data on PC

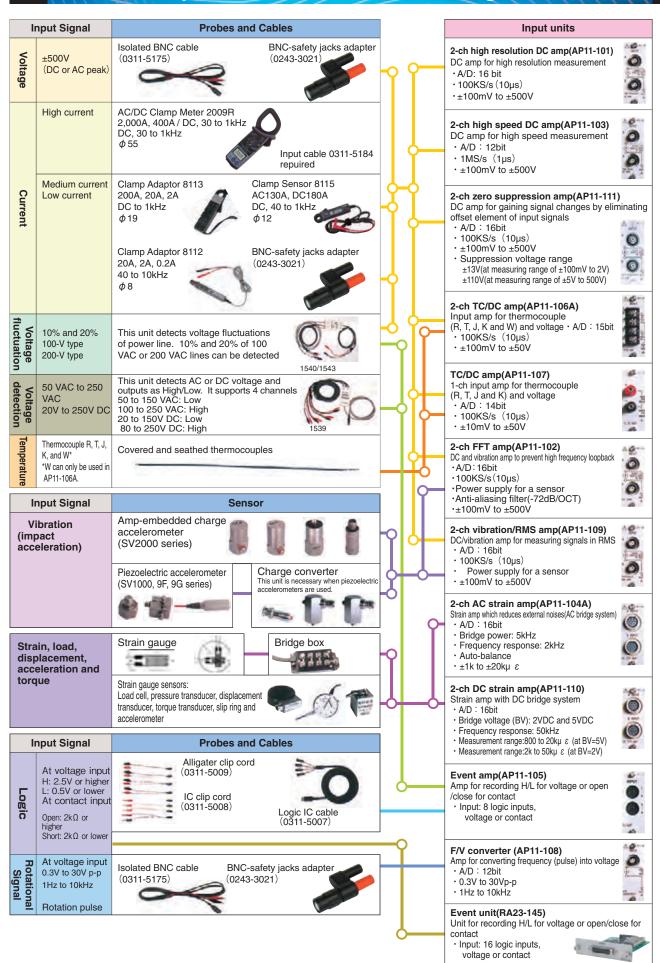
Display recorder display screen on PC monitor, enlarge time axis, scale x100 to x1/100, search (jump functions: time, address, event, & particular point), and readout of cursor data values.

#### File Conversion

Converts recorded data into Binary or CSV file formats.



## **Input Unit Selection Block Diagram**



# **Basic Specifications**

Diselect	12.1-inch TFT color LCD
Display	Effective screen area: 245.76mm x 184.32mm (1024 x 768 pixels)
Channel	RA2300A: 16ch (8 slots) + digital input 16ch (optional)
	RA2800A: 32ch (16 slots) + digital input 16ch (Cable is optional)
Printer	
Printing Method	Thermal printing using a thermal head
Paper Width	219.5mm
Effective Recording Width	1 division (200mm · FS) to 16 division (10mm · 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
D	RA2300A: Clock, Setting value: approx 3 to 5 years (using a primary battery)
Battery Backup	RA2800A: Clock, Setting value: approx 3 years (using a primary battery)
Storage Device	40GB Hard Disk Drive (HDD) , USB memory,
Interface	Ethernet, USB:standard *** Ethernet has basis over CAT5 (shilded)
Interrace	RS-232C, Remote terminal : optional
0 21 70 2	EMC: EN1326 A1/A2/A3
Compatible specifications	Safety: EN61010-1
Operating Enviroment	Temperature: 5 to 40 °C , Humidity: 35 to 80 %RH (without condensation)
Power Supply	90 to 264VAC, frequency 50 to 60Hz
D 0 "	RA2300A: 100VA (typical): with AP11-101 x 8 units (approx 300VA max)
Power Consumption	RA2800A: 170VA (typical): with AP11-103 x 16 units (approx 350VA max)
Dimensions	RA2300A: Approx. 369.5(W) x 164.5(H) x 301(D) mm
Dimensions	RA2800A : Approx. 400(W) x 270(H) x 380(D) mm
	RA2300A: 8.0kg or less(main body only), 8.7kg or less(main body with AP-11-103x4 units
Weight	RA2800A: 16.4kg or less(main body only), 18.8kg or less(main body with AP-11-103x16 units

#### ■ Communication & Storage Specifications

HDI	n			
110				
	Function Setting conditions of main unit and save/read out of measured data			
	Capacity	40GB (system domain 5GB + data storage space 35GB)		
Eth	Ethernet			
	Function	Control with communication command, Windows and file sharing with Windows PC		
	Standard	10/100 BASE-T		
USE	3			
	Function	Data saving on strage device by USB connection		
	Standard	2.0		
	Available Storage Device	USB memory		

#### ■ 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 Amp (AP11-105), main unit event (option for RA2300A)		
	State setting: H, L, or X can be set for each input. When X 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 ( TTL Law active H:over 2V, L:below 0.8VPulse width : approx 10 ms)	
Pre-trigger	0 to 100% ( 1% step )	
Trigger mark	Record trigger point with an arrow ( $\downarrow$ ) and print print year, date and time trigger occurred.	
Trigger filter	1 to 65534 samples	

## ■ Measuring Mode (Acquisition/Recording) Specifications Pen Recorder

Way	veform Printing	
	Function	Printout input signal data on recording paper (wavefrom)
Mesurement Starting Operation		Start with pressing START key or preset time. Interval recording available.
	D ( 10 1	RA2300A: 100 mm/s to 1 mm/min (user setting, external synchronization enabled)
	Paper-feed Speed	RA2800A: 50 mm/s to 1 mm/min (user setting, external synchronization enabled)
	Frequency Response	DC to 100 kHz (sampling : 10 points/cycle). Varies by input units.
	Printing Density	Voltage axis: 8 dots/mm, Time axis: 80 dots/mm (at 25 mm/s)
	Printing Length	Continuous
Dat	a Backup	N/A

	ID Necoluei	
Da	ta Recording	
	Function	Real-time recording of measured data on HD (sample of peak style is selectable)
	Recordable Size	35GB max
	Mesurement Starting Operation	Start with pressing START key, trigger detection or preset time.
	Sampling Speed	RA2300A: 1µs (w/1ch), 5µs (w/8ch), 10µs (w/16ch) max
		RA2800A: 2µs (w/1ch), 10µs (w/16ch), 20µs (w/32ch) max
	Recording Method	Normal or Ring recording (repeated recording during preset time) selectable.
Wa	veform Printing (Refer to Pen Rec	corder spec)
	Function	Printout input signal data on recording paper (wavefrom)
	Mesurement Starting Operation	ON/OFF of printout to recording paper while HD recording

#### Memory Recorder

Data Recording	
Function	Record measured data on memory in main unit.
Mesurement Operation	Once, Repeat, or Endless
Memory Capacity	RA2300A: 2MW/ch (w/16ch), 32MW/ch (w/1ch)
	RA2800A: 1MW/ch (w/32ch), 32MW/ch (w/1ch)
Memory Division	1, 2, 4, 8, 16, 32, 64 or 128 divisions
	RA2300A: 1µs to 100s (user setting, external synchronization enabled)
Sampling Speed	RA2800A: 2µs to 100s (user setting, Sampling is sychronized with RA28-132)
Waveform Printing	
Function	Printout input signal data on recording paper (waveform)
Printing Density	Voltage axis: 8 dots/mm, Time axis: 10 dots/mm
Copy Magnification	x100 to x1/10,000
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

	Steady-state and transient events can be recorded simultaniously 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 available)

## ■ Measuring Mode (Acquisition/Recording) Specifications X-Y Recorder

Function		ON/OFF of locas enabled (pen up & down)
run	CHOTI	Input signall 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	a recording	
Function		Record all input signals (if input channels is ON at amp setting display) on HD.
X-Y	waveform Printing (Printout)	
	Function	Printout displayed waveforms (X-axis : 1ch, Y-axis : 3ch) at A4 size
Resolution		1600 x 1600 dots (at printout), 650 x 650 dots ( at display)

#### ■ Measured Data Display (Replay Monitor) Specifications

ivieasureu Data Display	(neplay Monitor) Specifications
Function	Display recorded data at X-T or X-Y when pressed "Replay" button on operation panel.
Available Measuiring Mode	All (irrelevant to actual measuring mode)
Y-T Display	
Waveform Division	1 to 16 divisions
Display Magnification	x 100 to x 1/10,000 (*** Peak style is not enlarged)
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

#### ■ Output Specifications

Prir	nter	
	Data Information	Measuring mode, year/month/day, mesurement start time, data No., trigge 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
	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)
Aut	o Function	
	Function	By pressing "Auto" button on an operational panel, sampling speed and input range are
	runction	auto-configured in reference to input signal.
	Auto sample	Display speed, paper feed speed memory sampling speed are auto-configured
	Auto range	Range in input amps is auto-configured. (Except for event amp : AP11-105)
Tim	ner Function	Start time, end time and interval can be set.
CS	V conversion	Available (also batch conversion of multiple memories or files)
Scr	een Image Saving	Save screen image on HDD at BMP format (colored)
Мо	nitor output	Images on LCD are output to monitor by XGA (1024 x 768 dots): RA2800A only
Save/Readout of Settings		Save up to 4 settings (input and main unit settings conditions) on 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.
		Display position of event amp (AP11-105) and main unit (option for RA2300A) is movable. (ever
Waveform Displayof Event Input		8ch,standard position and pitch are configurable. In case of RA2800A with event amps, 8 units are
		available for display and recording at the same time. (16 units are available for data recording)

## Optional Unit AC Bridge Power Supply Unit (RA23-143)

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

#### RS-232C Unit (RA23-142)

Standard		JIS X5101 (former C6361) complied
Tra	nsfar speed	38400, 19200, 9600, 4800 or 2400bps
Co	nnector	D-sub 9-pin connector
Fur	ection	
	Shutdown	Shutdown operation when using UPS
	Remote Control	Remote Control from PC via RS-232C cable
We	ight	50g or less

#### Remote Unit (RA23-144)

Function	Start, Stop, Mark print, Paper feed is possible by the external signal. Input synchronization
Function	pulse. Output error signal. Input UPS protect signal.
Cables	1.5m, I/O connector 28-pin and open wire.
Weight	65g or less

#### Event Unit (RA23-145) \*1, Event Unit A (RA23-145A) : RA2300A Only

Function	Input logic signal directly into main unit (independent from other amps)
Number of signals	16
Input Signals	Voltage input : input voltage range 0 to +5 V
Signal level	H : over 2.0V, L : below 0.8V
Cables	RA23-145 : Event Input Cable (0311-5252)
ables	RA23-145A: Event Input Extention Cable (RA23-127)
Weight	60g or less

#### Event BOX Set (RA23-146) : RA2300A Only

Function	Input logic signal directly into main unit (independent from other amps)
Number of signals	16
Input Type	Common ground in unit, case-free
	Sets voltage or contact for each channel
	Voltage input : input voltage range 0 to +24 V
Input Signals	Detection level : H level 2.5V or higher
	L level 0.5V or higher
	Contact input : open 2k $\Omega$ or higher, close 250 $\Omega$ or lower
Response Time	Within 1µs (at input "H", level +5V or higher)
Input Connector	Circular DIN connector 8P x 4, Event Amp Unit side : XT2B-0800 (conformity with DIN45326)

<sup>\*1</sup> Event unit (RA23-145, RA23-145A)

The difference of unit style is only standard cables(0311-5252 or RA23-127) . Units have same spacifications. Regardless of styles, FRA23-1451 is printed on units.

Object data	internal memory data, filing data (extension : DRT, FSD) % except for peak style (extension : FPP, IDX)
Interval statistical calculation	
Caluculation	max, min, P-P value, average, square, actual value, standard deviation, rising time, trailing time
Out put file format	CSV data
Functional culculation	·
	four arithmetic operations (+,-,x,÷), absolute value, first derivation, second derivation,
Caluculation	first integration, second integration, square root, index, common logarithm, moving average
	trigonometric function (sin, cos, tan, asin, acos, atan)
Out put file format	Binary or CSV data
FFT Analysis	·
	One signal analysis: linear spectrum, Power spectrum, RMSspectrum,
Function	power histogram density, octave analysis (1/1, 1/3)
	Two signal analysis: transfer function, cross power spectrum, coherence function
Analyzed data length	1000 (400), 2000 (800), 4000 (1600)
Window function	rectangular, hanning, hamming
Out put file format	Binary or CSV data

■ Unifizer NS3100( online funct	ion, offline function)
os	Windows 2000 / XP / Vista Ultimate
Available system	RA2000 series / RA1000 series / others
Interface	RA2000 series : Ethernet
Interface	RA1000 series : RS-232C / Ethernet
Connectable quantity	MAX 8 sets(RA2000series/RA1000series/others mixable)
	Pen recorder mode/HD recorder mode/Memory recorder mode/Multi recorder
Remote control	mode(RA2000 series)
	Memory mode/Real time mode/Transit mode/Filing mode(RA1000 series)
	RA series: 1ms _ 1000ms(1msSTEP), 1s _ 1000s(1sSTEP)*1
	Max recordable time: up to the half size of specified HD in PC
Setting range of transfer speed	** It may not transfer in set speed depending on CPU speed.
	Recommended CPU : over 2GHz
	Recommended memory capacity : over 512MB*
Real time data display function	Y-T waveform, X-Y waveform(split/overwriting), Digital display 2
	Y-T waveform, X-Y waveform(split/overwriting), Digital display
Play data display function	Data of RA2000 series/ RA1000 series is playable
	Playable extension: FSD, FPP, DRT, DAT*
	Readout value between cursor 1 and 2, time difference, amplitude difference, max/min
Cursor readout of playing data	value between cursors
	Arithmetic operation between channels, Power method, Square root, Absolute value,
	Customary logarithm, Index, actual value, Trigonometric function, Moving average,
	Derivation, Integration, Below functions are combined together _
A 201	Sine, Cosine, Tangent, Arcsine, Arccosine, Arctangent, Absolute value, Index,
Arithmetic operation	Logarithm natural, Customary logarithm, Square root, Cube root, Arithmetic operation CH
	specification, Power method, First-order derivation, Second-order derivation, First-order
	integration, Second-order integration, Saved data reference 1, Saved data reference 2,
	Moving average
	Conversion into CSV file following condition can be set
	<ul> <li>Specification of conversion area point, of period(μs, ms, sec), of time</li> </ul>
	Conversion channel
File conversion	Break character _ comma( , ), TAB
	Thinning out, simple, max/min value, average value, peak value
	Adding of header information
	· Saved file name
Saving and reading of recorded file	
condition	Available for arbitrary files
	1

#### Sensitive DIV unit (RA28-112) : Application for measuring electricity : RA2800A only

High resolution DC amplifier : AP11-101
FFT amplifier : AP11-102 (V measuring mode)
High speed DC amplifier : AP11-103Vibration
RMS amplifier : AP11-109 (V measuring mode)
Zero suppression amplifier : AP11-111
AC200V/cm, AC100V/cm, AC63.5/cm, 100V/cm, 50V/cm, 25V/cm, 10V/cm, 5V/cm,
2.5V/cm, 1V/cm, 0.5V/cm : Max input voltage ±500V
0.1V/cm, 0.05V/cm: Max input voltage ±100V
All range _ fine adjustment of recording amplitude
AC range _ fine adjustment in AC range
Waveform division 1/1 fixed (1 scale is 1cm on recording papers)
10mm standard, 10mm, 10mm longitudinal, OFF switch, (NO 5mm grid)
1cm x 1cm grid printing by default
Print of sensitivity information (no scale value)
Print of trigger time, ON/OFF function (pointer is printed at any time)
s/div range display (Pen recorder, Memory recorder, HD recorder)

#### Synchronous unit (RA28-132) : RA2800A only

Max	synchronous units	Total 10 sets
	nnector / cable length	Synchronous connector : RJ45 compliance
		Connection cable: Litz wire STP(Shield Twist Pair), Straight connection wire (CAT5e or
COI	inector / cable length	CAT6 compliance)
		Cable length: max 200m
Sett	ing	Selection of synchronous mode Master/ Slave / External synchronization
Dela	ay time (including connected uni	ts to whole connection cable length and trigger detection delay time)
	8µs	Within 200m: 2 units / 100m: 3 units / 33m: 4 units
	10µs	Within 200m: 3 units / 100m: 5 units / 33m: 7 units
	20µs	Within 200m: 5 units / 100m: 7 units / 33m: 10 units
	50µs	Within 200m: 10 units

## ■ Utility software RA Viewer (RA23-701)

OS	Windows2000/ XP, display 1024 x 768 and above	
Available system	RA2000 series / RA1000 series	
Y-T display		
Peace wise representation	1 _ 16 split	
Display magnification	x100_x10,000	
Thumbnail function	Optional 1ch of whole data is available for display on thumbnail bar	
Value display	Value, cursor value, value + cursor value (switching)	
Search function	Search by cursor, time, address, max/min, event	
X-Y display		
Display channel number	Selected data can be displayed on x-axis:1ch, y-axis:3ch	
Out put file format	Binary or CSV data	
Download	This software is available for download after completion of user registration	

- \*1: Setting speed may not work due to constraint of main unit or CPU speed in PC.
  \*2: Real time monitor is not displayed for RA1000 series.

# 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 $\Omega$ 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)		
hange Accuracy	AP11-103: within ±0.5% FS(within ±0.8% FS at ±500V)		
Offset Accuracy	AP11-101: within ±0.3% FS(at 25°C)		
Oliset Accuracy	AP11-103: within ±0.5% FS		
Linearity	AP11-101: within ±0.1% FS(at 25°C)		
Linearity	AP11-103: within ±0.2% FS		
Allowable Input Voltage	Range of ±10V to 500V: ±500V max(DC or AC peak values)		
Allowable Iliput voltage	Range of ±0.1V to 5V: ±100V max(DC or AC peak values)		
CMV	Unit only: 42V (DC or AC peak values)		
CIVIV	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)		
rrequericy nesponse	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)		
Low-pass i liter	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)		
AD CONVENTED	AP11-103: 12-bit, 1MHz max(simultaneous 2-ch sampling)		
Temperature Stability	AP11-101/zero point: within ±0.02% FS/C		
Temperature stability	AP11-103/zero point: within ±0.03% FS/°C		
Gain(Range)	within ±0.01% FS/C		
Weight	AP11-101: approx 230g or less, AP11-103: approx 240g or less		

#### F/V Converter(AP11-108)

17V Converter(AF 11-100)			
Input	1 ch/unit, isolated unbalanced input, BNC connector		
Input Coupling	AC and DC coupling		
Input Impedance	100kΩ or higher		
Input Frequency Range	1Hz to 10kHz(pulse width: 20 µs 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		
CIVIV	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/°C Gain(range): within ±0.02% FS/°C		
Weight	125g or lace		

Input		2 chs/unit, isolated unbalanced input, isolated BNC connector	
Input Coupling		AC and DC coupling	
Input Impedance		1M Ω or higher	
Power Supply for S	ensor	2mA, 18V or higher	
Measurement Rang	e	0.1,0.2,0.5,1,2,5,10,20,50,100,200,500V	
A	Voltage	Within ±0.3% FS(within ±0.8% FS at ±500V)	
Accuracy	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)	
CIVIV		When using isolated BNC cable(optional): 300VAC	
Frequency Respon	se	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/C Gain(range): within ±0.01% FS/C	
Weight		270g or less	

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

Input 2 chs/unit, isolated unbalanced input, isolated BNC connector			
Input Coupling	ut Coupling  AC and DC coupling(only AC coupling when connected with amp-embedded piezoelectric acceleron		
Input Impedance	1M Ω 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)		
OLD	Unit only: 42V (DC or AC peak values)		
CMV	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)		
A-4: -1:: F:14	20, 40, 80, 200, 400, 800Hz, 2, 4, 8, 20, 40kHz		
Anti-aliasing Filter	Drop characteristics: -72dB/OCT at 1.5 x fc		
Offset Accuracy	within ±0.3% FS(at 25°C)		
A/D Converter	16-bit, 100kHz max		
Temperature Stability Zero point: within ±0.02% FS/°C Gain(range): within ±0.01% FS/°C			
Weight 240g or less			

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

2 011 10/10	O Aiii	p(//// // // // // // // // // // // // /	a TO/DC AIIIp(AFTI-107)		
Input			AP11-106A: 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 Impeda	ance		10M Ω or higher(approx 1M Ω at 5	5, 10, 20, 50VFS in DC range)	
Thermocoup	ماد		AP11-106A: R, T, J, K, W		
тнеттюсоар	10		AP11-107: R, T, J, K		
Measuremen	it Range	e(Temperature)	AP11-106A	AP11-107	
R:			1760°C FS(0 to 1760°C)	800°C FS(0 to 800°C ), 1600°C FS(0 to 1600°C )	
T:			400°C FS(-200 to 400°C)	200°C FS(-200 to 200°C ), 400°C FS(-200 to 400°C )	
J:			1100°C FS(-200 to 1100°C)	200°C FS(-200 to 200°C ), 1000°C FS(-200 to 1000°C )	
K:			500°C FS(-200 to 500°C ), 1370°C FS(-200 to 1370°C )	200°C FS(-200 to 200°C ), 1200°C FS(-200 to 1200°C )	
W:			2300°C FS(0 to 2300°C)	N/A	
Measuremen	. D	-(\/-!+\)	AP11-106A: 100, 200, 500mV, 1, 2, 5, 10, 20, 50V FS		
weasuremen	ii nangi	e(voltage)	AP11-107: 10, 20, 50, 100, 200, 50	0mV, 1, 2, 5, 10, 20, 50V FS	
D A			Temperature: ±0.5% FS(within ±1% at 0°C or lower)		
Range Accur	racy		±0.3%. FS(AP11-106A), ±0.5%. FS	S(AP11-109)	
Cold Junction	n		Internal/external switchable. Accuracy: within ±2°C (within ±1°C at stable temperature		
Compensatio	on		of 20°C at input terminal)		
Linearity			Within ±0.1% FS		
Allowable Inp	put Volta	age	50V (DC or AC peak values)		
CMV			AP11-106A: 42V(DC or AC peak values)		
CIVIV			AP11-107: 300V(DC or AC peak values)		
Frequency R	espons	е	DC to 40kHz(+0.5, -3dB)		
			Bessel type(attenuation factor: -18dB/OCT)		
Low-pass Filt	ter		1, 30, 500, 5kHz, OFF(+0.5, -3dB)		
			AP11-106A: 15-bit, 100kHz max(simultaneous 2-ch sampling)		
A/D Converter			AP11-107: 14-bit, 100kHz max		
Temperature Stability Weight			When used as temp amp/gain(range): within ±0.04% FS/C		
		у	When used as DC amp/zero point: within ±0.03% FS/C		
			gain(range): within ±0.01% FS/°C		
			AP11-106A: 240g or less, AP11-107: 200g or less		
			AL 11-100A. 2709 01 1033, AL 11-107. 2009 01 1055		

Event Amp(AFT1-103)				
Input	8 channels/unit			
Input Type	Common ground in unit, case-free			
	Sets voltage or contact for each channel			
	Voltage input: input voltage range 0 to +24V			
Input Signals	detection level: H level 2.5V or higher			
	L level 0.5V or lower			
	Contact input: open 2k Ω or higher, close 250 Ω or lower			
Response Time	Within 1µs (at input "H", level +5V or higher)			
Cables	Logic IC cord(0311-5007) x 2; alligator clip cord(0311-5009) x 2			
Cables	IC clip cord(0311-5008) x 2			
Weight	100g 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), 50000pC(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 20μVrms or lower(AP11-902), 100μVrms or lower(AP11-901, AP11-903)			
Phase	180°		
Operating Temperature	-20 to 80°C (AP11-901), -20 to 110°C (AP11-902, AP11-903)		
	Input: miniature connector(10-32UNF)		
Connector	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)			

Input			2 chs/unit, isolated unbalanced input, isolated NDIS connector		
Input Coupling			AP11-104A: balanced input(isolation: between channels inside unit or between each		
			channel and chassis) AP11-110: DC		
Inp	put Impedance		10M Ω + 10M Ω or higher (AP11-110 o	nly)	
			AP11-104A: sine wave 2Vrms, 5kHz(AC	bridge power supply RA23-143 required)	
Bri	idge Power Supply		AP11-110: 2V, 5V		
Αp	plicable Gauge		AP11-104A: 120 to 1k Ω		
Re	esistance		AP11-110: 120 to 2k Ω (at BV=2V), 350	to 2k Ω (at BV=5V)	
<u></u>	auge Factor		AP11-104A: 1.9 to 2.2		
G2	auge Factor		AP11-110: 2.0		
	(0.1		AP11-104A/resistance: ±2%(10000μ ε	) or lower capacitance: 2000pF or lower	
ma	ange of Balance		AP11-110/±3%(15000x10-6μ ε ) or low	er	
Ва	alance Method		AP11-104A	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 1channel	
	Remained Voltage	Accuracy	Within ±0.5% FS Within 0.3% FS		
Ma	ax Sensitivity(AP11-10	04)	Over full scale at 500μ ε (at bridge voltage of 2V or higher)		
Me	easurement Range		AP11-104A AP11-110		
		Strain	41 01 51 401 001 - 50	2k,5k,10k,20k,50kμ ε ·FS(at BV=2V)	
		Strain	1k,2k,5k,10k,20kμ ε ·FS	800,2k,4k,8k,20kμ ε ·FS(at BV=5V)	
		Voltage	N/A	2, 5, 10, 20, 50mV FS	
Ac	ccuracy		Within 0.3% FS(AP11-110 only)		
Int	ternal Calibrator and	Accuracy	±0.5k, 1k, 2k, 3k, 5kμ ε Accuracy: within ±0.5% FS (AP11-104 only)		
	**		AP11-104A: ±0.2% FS,		
LIF	nearity		AP11-110: ±0.1% FS		
C۱	ИV		300VAC		
All	lowable Input Voltage		±8V(DC or AC peak value)		
_			AP11-104A: DC to 2kHz(+1, -3dB)		
rre	equency Response		AP11-110: DC to 50kHz(+0.5, -3dB)		
	w-pass Filter		AP11-104A: butterworth type(attenuation factor: -12dB/OCT) 10, 30, 100, 300Hz and OFF(+1, -3d		
LO	w-pass riller		AP11-110: bessel type(attenuation factor: -12dB/OCT) 10, 30, 100, 300Hz and OFF(+1, -3d		
A/I	D Converter		16 bits, 100kHz max		
т.			Zero point: within ±0.05% FS/°C (AP11-1	Zero point: within ±0.05% FS/°C (AP11-104A), within ±0.1% FS/°C (AP11-110)	
10	emperature Stability		Gain(range): within ±0.05% FS/°C (AP11	-104A), within ±0.01% FS/C (AP11-110)	
Weight			285g or less(AP11-104A), 240g or less(AP11-110)		

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

Input	2 chs/unit, isolated unbalanced input, isolated BNC connector		
	AC and DC coupling(max allowable input ±30V at		
Input Coupling	AC coupling for measurement range ±0.1 to 2V)		
Input Impedance	1M Ω or higher		
Measurement Range	±0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500V F\$		
Range Accuracy	Within ±0.5% FS(within ±1.0% FS at ±500V FS)		
Offset Accuracy	within ±0.5% FS		
Linearity	within ±0.2% FS		
Allerra ble Jean & Welkers	range of ±5V to ±500V: ±500V max(DC or AC peak value)		
Allowable Input Voltage	range of ±0.1V to ±2V: ±100V max(DC or AC peak value)		
CMV	42V (DC or AC peak values)		
CMV	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,			
Low-pass Filter	Bessel type(attenuation factor: -12dB/OCT) 30, 300, 3kHz, OFF(+0.5, -3dB)		
	±13V at ±0.1, 0.2, 0.5, 1 and 2V range		
	±110V at ±5, 10, 20, 50, 100, 200, 500V range		
Suppression Voltage	Resolution: 500μV or less at ±0.1, 0.2, 0.5, 1 and 2V range		
Suppression voltage	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%/°C (at suppression voltage +13V max)		
	Recognize current input voltage and suppress the voltage automatically.		
Auto Zero Suppression	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/°C Gain(range): within ±0.01% FS/°C		
Weight	260g or less		

## Main Unit & Accessories

<b>Z</b>		Item Model		Standard accessories	
	lair		RA2300A	AC power cable(w/adaptor) x 1, recording paper x 1, paper holder x 1, input unit slot cover plate x 1set, Display	
	_	Omniace Ⅲ	HA2300A	Protection Board x 1, Touch Panel Sheet x 1 and user's manual x 1	
	nt,	Offiniace III	ппасе ш	RA2800A	AC power cable(w/adaptor) x 1, recording paper x 1, paper holder x 1, input unit slot cover plate x 1set and user's
	7		nazouua	manual x 1	

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

	Item Model		Rating
	2-ch High Resolution DC Amp	AP11-101	Input: ±100mV to ±500V, A/D resolution: 16-bit, sampiling:10µs
	2-ch High Speed DC Amp	AP11-103	Input: ±100mV to ±500V, A/D resolution: 12-bit, sampiling:1µs (RA2800A : 2µs)
	2-ch Zero Suppression Amp	AP11-111	Input: ±100mV to ±500V, A/D resolution: 16-bit, sampiling:10µs
3	2-ch FFT Amp	AP11-102	Anti-aliasing filter: 72dB/OCT, with power supply for sensor
<u> </u>	Event Amp AP11-10		Input: 8 logics (voltage/contact)
_ ⊆	2-ch TC/DC Amp	AP11-106A	Input: R, T, J, K, W (±100mV to ±50V), A/D resolution: 15-bit
랊	TC/DC Amp AP11-107		Input: R, T, J, K (±10mV to ±50V), A/D resolution: 14-bit
	2-ch AC Strain Amp*2 AP11-104A		Frequency response: 2kHz, bridge power supply: 5kHz
	2-ch DC Strain Amp AP11-110		Input: 800 $\mu$ $\epsilon$ to 20k $\mu$ $\epsilon$ (BV=5V), 2k $\mu$ $\epsilon$ to 50k $\mu$ $\epsilon$ (BV=2V),
	2-ch Vibration/RMS Amp	AP11-109	Input: ±100mV to ±500V, sampiling:10µs, with power supply for sensor
	F/V converter	AP11-108	Input: 1 Hz to 10k Hz

<sup>\*2</sup> Optional AC bridge power unit(RA23-143) required.

	Item		Model	Rating
	Arithmetic FFT U	nit	RA23-751	
	Sensitivity DIV se	etting Unit	RA28-112	RA2800A only
	Synchronous Uni	it	RA28-132	RA2800A only
		Remote Unit	RA23-144	W/cable(1.5m,I/O connector 28-pin and open wire)
	F	RS-232C Unit	RA23-142	
	AC Bridge Powe	r Supply Unit	RA23-143	
	Dust Cover		RA11-121	RA2300A only
	Dust Cover		RA28-114	RA2800A only
	Touch Panel She	et	RA23-125	RA2300A only, 3 pieces/Set
	Display Cover		RA23-126	
	Display Protectio	n Board	RA23-131	RA2300A only
	E	Event Unit	RA23-145	RA2300A only, W/Cable(0311-5252)
		Event Unit A	RA23-145A	RA2300A only
		Event Input Extention Cable	RA23-127	RA2300A only
		Event Input Cable	0311-5252	RA2300A only
	Event input	Event Box _Set	RA23-146	RA2300A only
		Event Box	RA23-316	RA2300A only
		Connecting Cable for Event Box and I/F	0311-5257	RA2300A only
		Event Box Interface	RA23-314	RA2300A only
	Hand Writing Tab	ble	RA23-128	RA2300A only
0	Hard Carring Ca	ea (w/Casters)	RA11-117	RA2300A only
ğ	_		RA28-113	RA2800A only
2	Soft Carryig Case	е	RT36-115	RA2300A only
<u>=</u>	Roll Paper Take-ı	ın	RT31-164	RA2300A only
Optional Unit	Holi Faper Take-up		RA28-119	RA2800A only
t	Z-fold Paper Stor	age Box	RT12-103	RA2300A only, Including Z-fold paper adaptor (RA12-301)
		-9	RA28-115	RA2800A only, Including Z-fold paper adaptor (RT34-312)
	Z-fold paper ada	ptor	RA12-301	RA2300A only
		,	7191-5010	RA2800A only
	Mobile Cart		RA11-118	RA2300A only
			RA28-116	RA2800A only
	Rack Mount Brad	cket for EIJ	RA28-118 AP11-901	RA2800A only
	Observe Commit	Charge Converter*1 AC/DC Voltage Detector		1.0mV/pC,small type(connected to input amp),connectors(input:miniature connector,output:BNC male)
	Charge Converte			1.0mV/pC,connectors(input:miniature connector, output:BNC female)     0.1mV/pC,for high sensitivity sensors connectors(input:miniature connector, output:BNC female)
	AC/DC Voltage F			4 inputs
	AC/DC Voltage L	Detector	1539 1540	1 input, 100VAC / 120VAC
	AC Voltage Leve	I Detector	1543	1 input, 220VAC / 240VAC
	Voltage Output C	able.	0311-5004	Length: 1.5m, connectors : pin tip and banana plug
	Voltage Output E		0311-5004	Length: 1.3m, connectors : pin tip and banana plug  Length: 1.4m, connectors : pin tip and pin tip jack
	AC/DC Digital CI		2009R*2	for high current (2000A, 400A / DC and 30 to 1kHz)
	AC/DC Digital CI		8113*3	for medium current (200A, 20A, 2A / DC to 1kHz)
	Clamp Adaptor	απρ Ασαρτοι	8112*3	for low current (200A, 2A, 0.2A / 40 to 10kHz)
	AC/DC Clamp Se	ansor	8115*3	for low current (AC / 130A, DC / 180A / DC, 40 to 1kHz)
		le (for Clamp Meter 2003A output)	0311-5184*4	Length: 2m, small plug for microphone and isolated BNC
		ower Supply system	SUA500JB*5	Smart-UPS500
	UPS cable	ower oupply system	0311-5256*5	Length: 2.5m
	UF3 Cable		U311-3230	Longer, Zorn

<sup>&</sup>quot;1 Required for using piezoelectric accelerometor with 2-ch vibration/RMS amp or 2-ch FFT amp.

\*2 Use signal input cable(0311-5184) if connecting output from 2009R to RA2300A/RA2800A

\*3 Use a BNC adaptor(0243-3021) if connecting output from 8112, 8113 and 8115 to RA2300A/RA2800A

\*4 Cable for inputting output from 2009R to isolated BNC connector of RA2300A/RA2800A

\*5 Required for RS-232C Unit (RA23-142), Uninterruptible Power Supply system (SUA500JB), UPS cable(0311-5256) to use auto shutdown function.

Cable	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 connector
		0311-5177	Length: 2m, safety-BNC connector and open wire
		0311-5160*6	Length: 2m, 2-banana and alligator clip (+:red, -:black)
		0311-5174*6	Length: 2m, 2-banana and BNC connector
	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 and BNC connector
	Logic IC cable	0311-5007	Logic IC cord (1pc)
		0311-5008	IC clip cord(4pcs/set)
		0311-5009	alligator clip cord(4pcs/set)
	Event input cable	0311-5001	Length: 1.5m, DIN8P and open wire
	Event input extension cable	0311-5005	Length: 1.5m, DIN8P plug and DIN8P socket
	BNC Adaptor	0243-3021	Isolated BNC connector and S terminal plug
	BNC Adaptor ( for AC bridge power distribution)	0243-2118	T-type Plug / 2receptacles coupler
	AC power cable	47326	Length: 2.5m with adaptor

<sup>\*6</sup> BNC adaptor(0243-3021) required if connecting to input unit with isolated BNC terminal.

r, ding	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 (100m roll paper)	YPS114	RA2800A only, 220x100m roll paper(1roll/box)
	Recording paper (Z-fold paper)	YPS112	220x201m Z-fold paper(1 set/box)

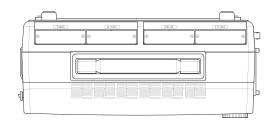
<sup>\*7</sup> Quality not assured if used papers other than above.

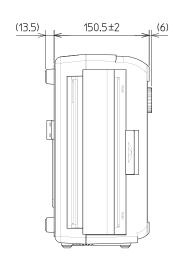
ware	Item	Model	Rating		
	Unifizer basic PKG	NS3100-P01	RA2000series, remote control PKG	Windows 2000 Windows XP Windows Vista Ultimate (32bit)	
	Unifizer basic PKG	NS3200-P01	RA series, off line data display PKG		
	Unifizer basic PKG2	NS3100-P02	RA1000series, remote control PKG		
	Unifizer basic PKG3	NS3100-P03	RA1000/RA2000series, remote control PKG		
	Unifizer extension PKG1	NS3100-P04	NS3100-P01+RA1000, driver addition PKG		
	Unifizer courtesy PKG'8	NS3100-C01	RA2000series, remote control PKG		
	Unifizer courtesy PKG <sup>'8</sup>	NS3200-C01	RA series, off line data display PKG		
	Unifizer courtesy PKG2 <sup>*8</sup>	NS3100-C02	RA1000series, remote control PKG		
	Unifizer courtesy PKG3*8	NS3100-C03	RA1000/RA2000series, remote control PKG		

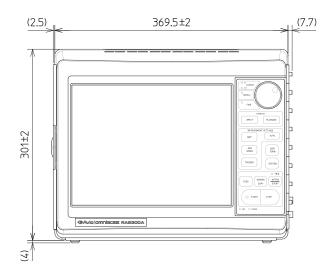
<sup>\*8</sup> Unifizer courtesy PKG is only for the owner of Omni viewer (NS2100) .

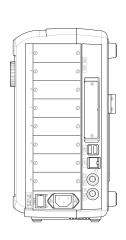
## External Drawing

## Dimensions of RA2300A

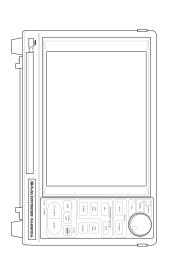


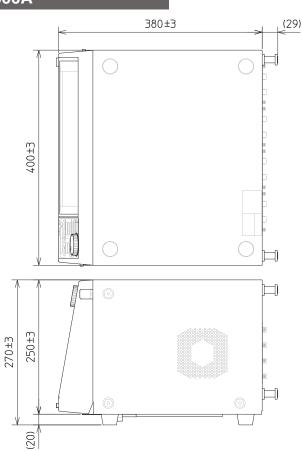


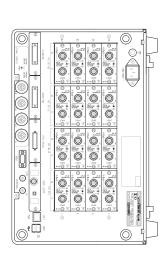




#### ■ Dimensions of RA2800A







## Option Unit Appearance



RA2300A Only



RA2300A Only



RA2300A Only





RA2300A Only



RA2300A Only



RA2300A Only



RA2800A Only



RA2800A Only



RA2800A Only



RA2300A Only





## NIPPON AVIONICS CO.,LTD.

#### **Infrared & Measuring Equipment Division**

1-5, Nishi-Gotanda 8-chome, Shinagawa-ku,

Tokyo 141-0031 Japan Phone: +81-3-5436-1614 : +81-3-5436-1395

E-mail: product-irc-e@avio.co.jp



#### **WARNINGS & CAUTIONS**

Before using this product, please carefully read the provided Operation Manual "WARNINGS" & "CAUTIONS" section to ensure proper operation. Please do not place the product in high temperature, high humidity or high inert gas environments.

Distributor:

http://www.avio.co.jp/english/