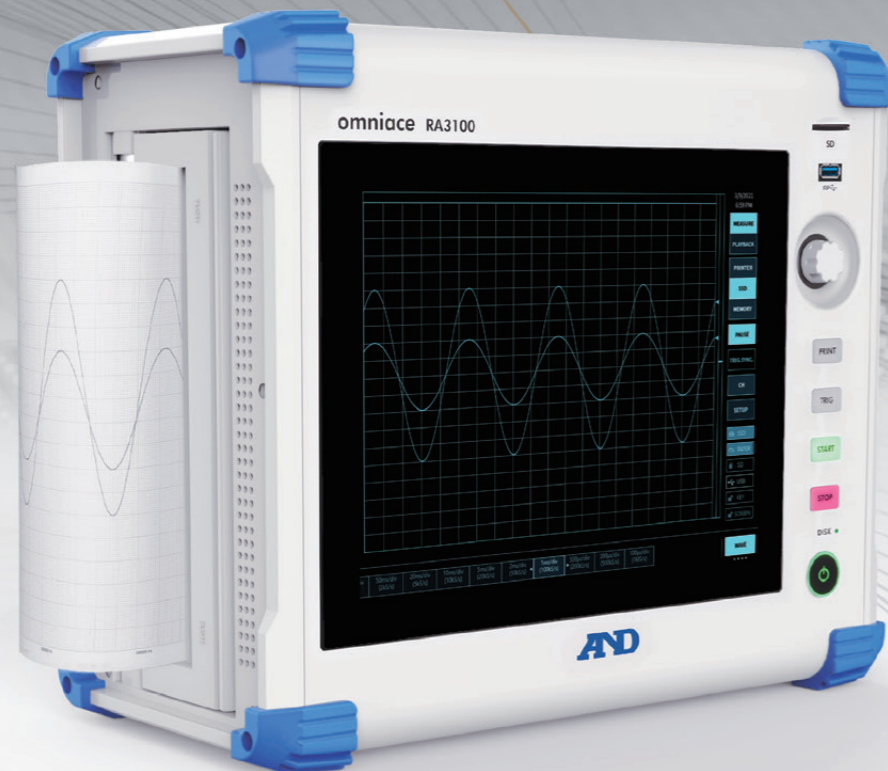# omniace
RA3100

D A T A   A C Q U I S I T I O N   S Y S T E M

All data recorded in Omniace
High-speed, long-term recording of phenomena on large-capacity storage media

**Data Acquisition System**

Omniace RA3100

Omniace RA3100 is a data acquisition system for research, development, and field maintenance, which enables accurate and long-term measurement of high-speed switching waveforms, even in severely noisy environments, in electric automobiles, electronic appliances, railroad cars, and solar power generation systems utilizing inverter control technology that has become widespread in recent years.

Multi-channel input	Max 36ch (analog input) Max 144ch (logic input)
High speed sampling	Max 20MS/s
Long-term recording	Memory capacity 4GB (when 18 channels are used, 20MS/s, 5 seconds) 256GB SSD (1MS/s, approximately 59 minutes when using 36 channels.)
High-speed and High-definition printing	Maximum chart speed 100mm/s Back up to SSD even if there is no chart paper.
Various recording method	Recording to Memory, SSD, and Printer. All data can be measured simultaneously.
Input modules	Voltage, Temperature and Logic Input Module
Excellent visibility and operability	12.1-inch LCD with touch panel provide you excellent visibility and operability.
Back scrolling	Data being measured can be played back without ending the measurement.
Various Monitor Displays	Y-T waveform, X-Y and FFT analysis can be displayed on the LCD monitor during measurement.

High-speed Sampling and High-definition Measurement
at *20M S/s with 18ch for 5 seconds*

"The 2ch High-Speed Voltage Module" is an input module for high-speed sampling at the highest level of the series. Includes the ability for a sampling rate of 20MS/s, input voltage up to ±500 V, and 14 bit resolution. 9 modules can be installed in the main unit, allowing for 18-channel high-speed memory recording.
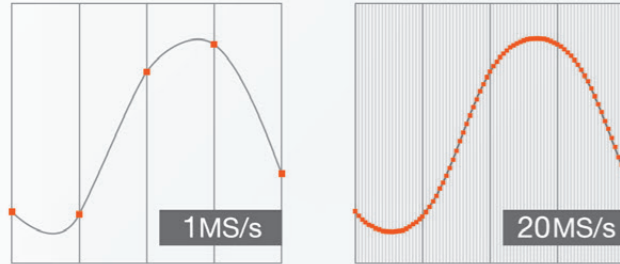
Sample Rate

	2ch	8ch	18ch
20MS/s	50 sec	10 sec	5 sec
10MS/s	1 min 40 sec	25 sec	10 sec
5MS/s	3 min 20 sec	50 sec	20 sec
2MS/s	8 min 20 sec	2 min 5 sec	50 sec
1MS/s	16 min 40 sec	4 min 10 sec	1 min 40 sec
500kS/s	33 min 20 sec	8 min 20 sec	3 min 20 sec
10kS/s	27 hrs 46 min 40 sec	5 hrs 33 min 20 sec	2 hrs 46 min 40 sec
5kS/s	55 hrs 33 min 20 sec	11 hrs 6 min 40 sec	5 hrs 33 min 20 sec
2kS/s	138 hrs 53 min 20 sec	27 hrs 46 min 40 sec	13 hrs 53 min 20 sec
1kS/s	277 hrs 46 min 40 sec	55 hrs 33 min 20 sec	27 hrs 46 min 40 sec

1MS/s   **20MS/s**

Long-term Recording

Various recording speeds, multiple channels, and a high-capacity storage medium to support a large amount of data are included as standard. Recording desired signal accurately without missing detailed changes.

Memory capacity

4GB

(when 18 channels are used, 20MS/s, 5 seconds)
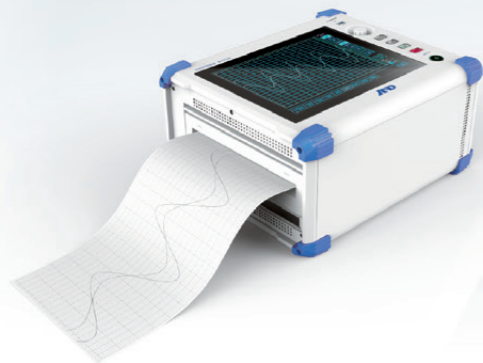
SSD

SSD capacity

256GB

(when 36 channels are used, 1MS/s, approximately 59 minutes)

High-speed, High-definition Printing

High-resolution waveform printing at high speeds (100mm/s) is possible.
Even if the chart paper runs out, recorded data is backed up to the SSD and can be printed out later.

omniace RA3100

Multi-channel Input

"The 4ch Voltage Module" allows 4-channel input with a single unit. 9 modules can be installed in the main unit, allowing 36-channel recording.
"The 16-channel Logic Module" allows 16-channel logic signal input with a single unit. 9 modules can be installed in the main unit, allowing 144-channel logic signal recording.
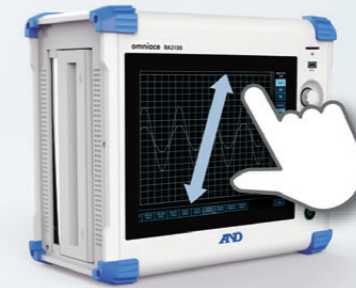
Max 36ch
with analog input

Max 144ch
with logic input

Excellent Visibility and Operability

The LCD display with touch panel allows zoom in and out, and scrolling through the waveform simply, allowing a dynamic waveform drawing and operability like a smartphone.
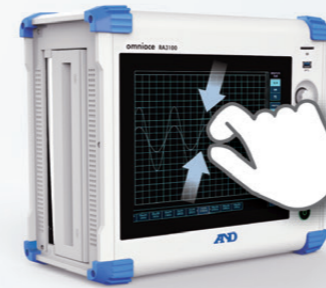
Pinch-in   **Pinch-out**   **Swipe**

Input Module

Up to 9 modules can be installed in the main unit.
Various modules for high-speed voltage, high-accuracy voltate, logic inut, temperature measurement, and remote control are available.

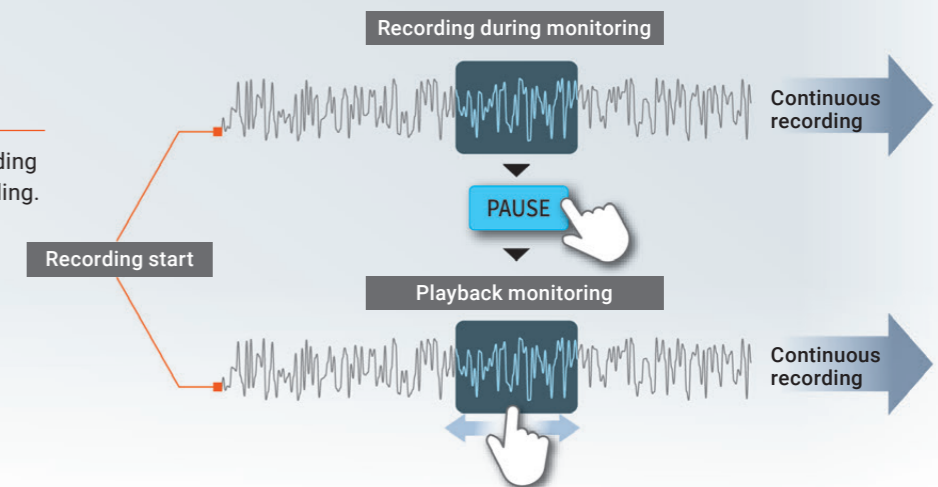**2ch Voltage Module**   **4ch Voltage Module**   **2ch High-speed Voltage Module**   **16ch Logic Module**   **2ch TC Module**

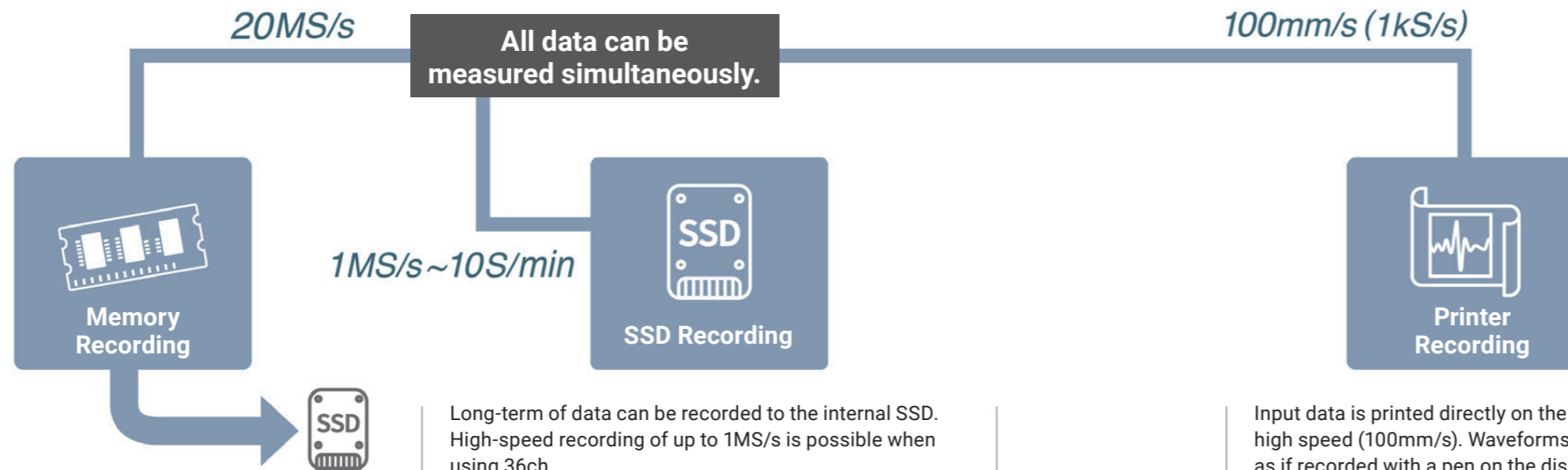| Module Name and Model	Channels	Sampling Rate	Input	Specifications
2ch Voltage Module RA30-101	2ch	1MS/s	±500V	Measure high-speed voltage measurement with anti-aliasing filters
4ch Voltage Module RA30-102	4ch	1MS/s	±200V	Multi-channel voltage measurement
2ch High-speed Voltage Module RA30-103	2ch	20MS/s	±500V	High-speed voltage measurement
16ch Logic Module RA30-105	16ch	1MS/s	Contact	Contact signal measurement
2ch TC Module RA30-106	2ch	1kS/s	Thermocouple : K, E, J, T, N, R, S, B, C RTD: Pt100, Pt1000	Measurement of temperature with a thermocouple and RTD

Back Scrolling

Press the [PAUSE] button during recording to playback recorded data while recording.

Recording during monitoring

Continuous recording

PAUSE

Recording start

Playback monitoring

Continuous recording

Various Recording Method

"Memory", "SSD", and "Printer" are provided as data recording destinations.
Data measurement can be performed at all three destinations at the same time.
This can be selected freely depending on the measurement purposes.

20MS/s

All data can be measured simultaneously.

100mm/s (1kS/s)

1MS/s~10S/min

Memory Recording

SSD Recording

Printer Recording

Memory mode records data in the internal memory (4GB) at high speed (max: 20MS/s). In addition, measurement can be performed under a variety of conditions using a variety of trigger functions.
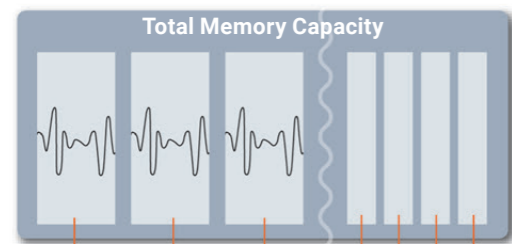
After the input data is recorded in the memory, it is automatically saved to SSD.

Sampling speed: 20MS/s to 10S/min
(depending on the input module)
Memory capacity: 4GB (2G point/ch)
Memory divisions: 1 to 200 divisions
Recording length: 2000 to 2G points/ch (1-2-5 step)

Total Memory Capacity

Memory Block Segment 1~200

Recordable Time on Memory

Sample speed	2ch	8ch	18ch	36ch
20MS/s	50 sec	10 sec	5 sec	—
10MS/s	1 min 40 sec	25 sec	10 sec	—
5MS/s	3 min 20 sec	50 sec	20 sec	—
2MS/s	8 min 20 sec	2 min 5 sec	50 sec	—
1MS/s	16 min 40 sec	4 min 10 sec	1 min 40 sec	50 sec
500kS/s	33 min 20 sec	8 min 20 sec	3 min 20 sec	1 min 40 sec
10kS/s	27 hrs 46 min 40 sec	5 hrs 33 min 20 sec	2 hrs 46 min 40 sec	1 hrs 23 min 20 sec
5kS/s	55 hrs 33 min 20 sec	11 hrs 6 min 40 sec	5 hrs 33 min 20 sec	2 hrs 46 min 40 sec
2kS/s	138 hrs 53 min 20 sec	27 hrs 46 min 40 sec	13 hrs 53 min 20 sec	6 hrs 56 min 40 sec
1kS/s	277 hrs 46 min 40 sec	55 hrs 33 min 20 sec	27 hrs 46 min 40 sec	13 hrs 53 min 20 sec

Long-term of data can be recorded to the internal SSD. High-speed recording of up to 1MS/s is possible when using 36ch.
Since it is stored as digital data, data can be analyzed after recording and data can be managed for a long period of time.

Input data is saved directly to SSD.

Sampling speed: 1MS/s to 10S/min
(depending on the input module)
SSD capacity: 256 GB
**Maximum recording time:** 100 days
Data format: Normal data, Peak data

Recordable Time on SSD

Sample speed	1ch	2ch	4ch	8ch	16ch	18ch	32ch	36ch
1MS/s	35 hrs	17 hrs	8 hrs	4 hrs	2 hrs	1 hr 58 min	1 hr	59 min
500kS/s	70 hrs	35 hrs	16 hrs	8 hrs	4 hrs	3 hrs 56 min	2 hrs	1 hrs 46 min
200kS/s	175 hrs	85 hrs	40 hrs	20 hrs	10 hrs	9 hrs 52 min	5 hrs	4 hrs 26 min
100kS/s	350 hrs	175 hrs	80 hrs	40 hrs	20 hrs	19 hrs	10 hrs	8 hrs 53 min
50kS/s	700 hrs	350 hrs	160 hrs	80 hrs	40 hrs	38 hrs	20 hrs	17 hrs 46 min
20kS/s	1750 hrs	850 hrs	400 hrs	200 hrs	100 hrs	95 hrs	50 hrs	44 hrs 56 min
10kS/s	2400 hrs	1750 hrs	800 hrs	400 hrs	200 hrs	190 hrs	100 hrs	89 hrs
5kS/s	2400 hrs	2400 hrs	1600 hrs	800 hrs	400 hrs	380 hrs	200 hrs	178 hrs
2kS/s	2400 hrs	2400 hrs	2400 hrs	2000 hrs	1000 hrs	950 hrs	500 hrs	444 hrs
1kS/s	2400 hrs	2400 hrs	2400 hrs	2400 hrs	2000 hrs	1900 hrs	1000 hrs	889 hrs

Window Recording

Endless recording is possible by specifying the ring buffer area (maximum 2G points/ch) as the window recording time. If you do not know when an abnormality will occur, you may miss the abnormal data if you set the recording time and measure. By ringing the recording area, you can always save the latest data.
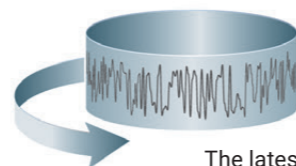
The latest data is always recorded.

Input data is printed directly on the chart paper at high speed (100mm/s). Waveforms are displayed as if recorded with a pen on the display, and the input module and chart speed can be set.
48ch signals can be printed on the chart paper.
In addition, as the data printed on the chart paper is also stored digitally on the SSD, the data can be printed out later, even if the chart paper run out.
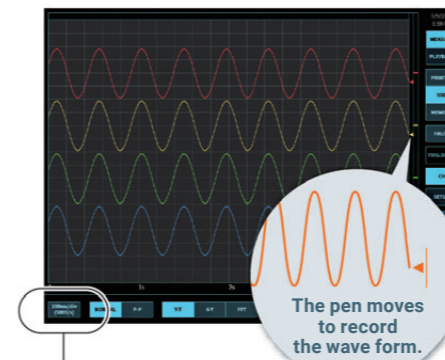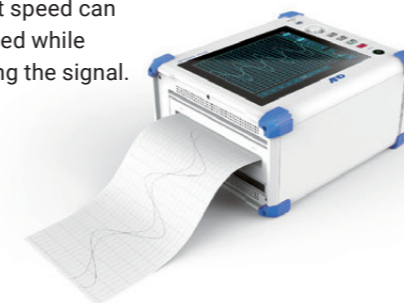
The pen moves to record the wave form.

Chart Speed

The chart speed can be changed while monitoring the signal.

Recording Specifications

Chart speed: 1kS/s (100mm/s) to 10S/s (1mm/min)
Recording resolution: 10 to 40 dots/mm (time axis)
8 dots/mm (amplitude axis)

Normal Data and Peak Data

Omniace is a digital recorder that performs analog to digital conversion on all inputs and records those signals. Due to the relationship between the speed of analog to digital conversion and the frequency component of the input signal, the data may or may not be measured correctly.

Normal Data

Normal data is recorded at each designated recording speed. (□ points)
If the signal changes too fast relative to the recording speed, the data singular point (peak value) may not be recorded. Memory recording can measure this type of data.
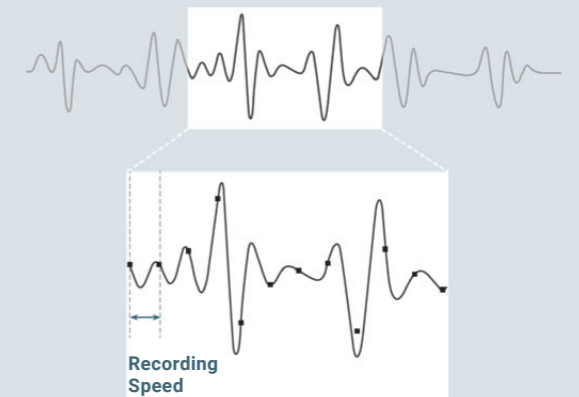
Recording Speed

## Peak Data

Peak data is sampling (■, ■ and □ points) between the designated recording speed at the fastest AD-conversion rate, and records two data points, the maximum value (■ points) and the minimum value (■ points). The amount of data can be compressed without losing the data singular point (peak value). Printer recording records data of this method on the chart paper.

Recording Speed
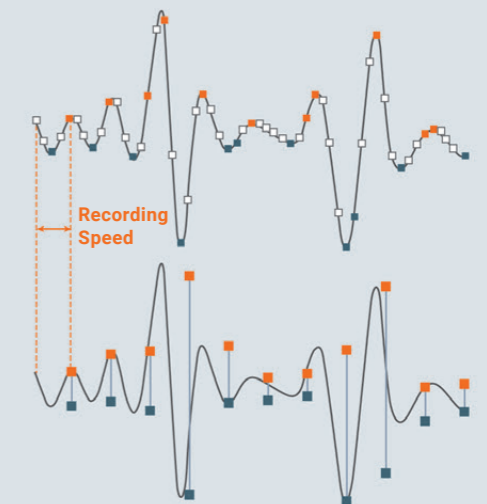
Various Monitor Displays

Input signal and recorded data can be displayed as Y-T waveform display, X-Y display, and FFT.
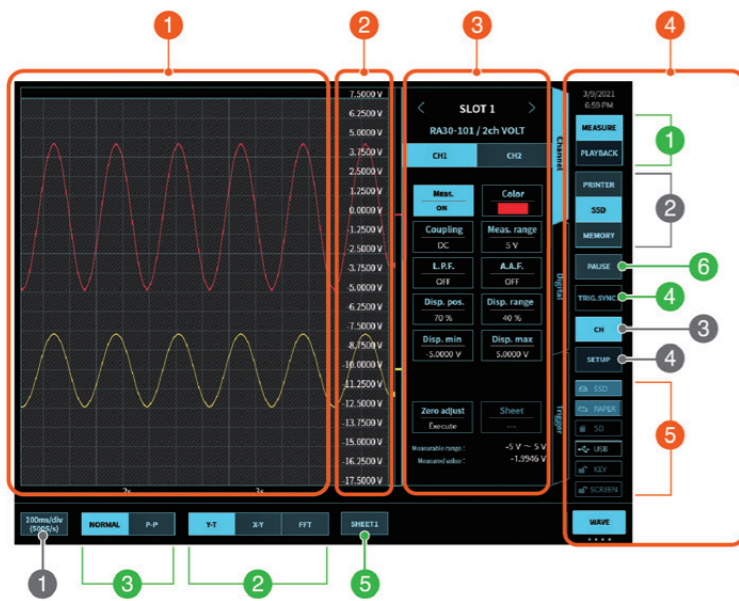
① Waveform display Area

② Scale area

③ Detailed setting area
Press the [CH] key in the "Operation key area" to make settings related to the input module.

④ Side menu area

⑤ Status display icon
Storage medium, interface, key lock

① Chart speed switching

② Monitoring device selection
• Data to printer
• Data to SSD
• Data to memory

③ CH
Input module settings

④ Settings
Measurement conditions setting screen

① Monitor selection
Measurement: Display the current input signal. Playback: Play back saved data

② Monitor waveform selection
Select Y-T waveform, X-Y, or FFT analysis.

③ Data format of waveform display when recording to SSD

④ TRIG.SYNC.
Monitor synchronized with a trigger

⑤ Sheet selection

⑥ Pause
Pause input monitoring

Y-T Waveform Display
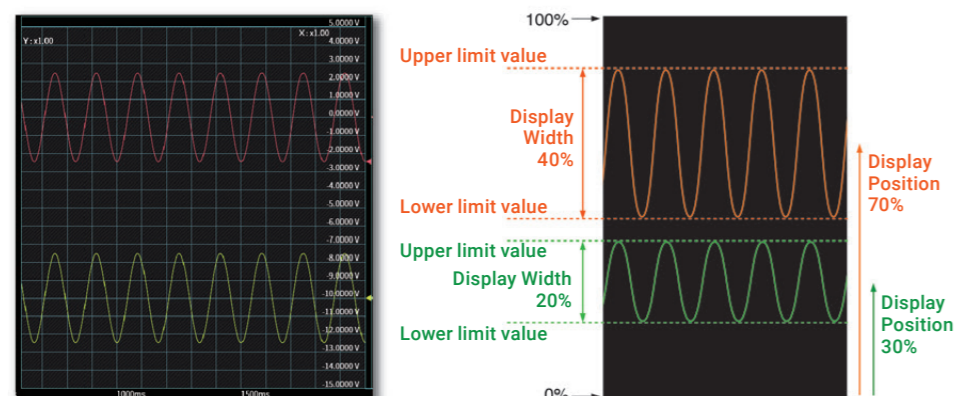
sheet 1
sheet 2
sheet 3
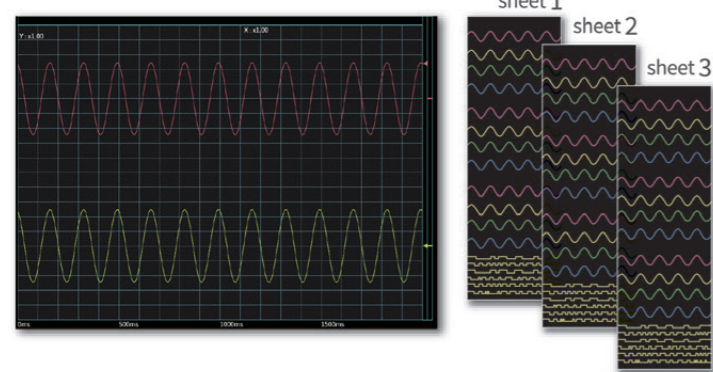
Display the measurement channels split into three sheets. (Max. 48ch can be registered per sheet)
Monitors up to 48 channels of signals on a graph with 20 divisions in vertical and horizontal.

Set the signal display width and display position.

Signals can be drawn at any position on the graph at any width. You can easily draw a 100V signal in the width of 1div.

100%
Upper limit value
Display Width 40%
Lower limit value

Upper limit value
Display Width 20%
Lower limit value

Display Position 70%

Display Position 30%

0%

Display Width
Display the signals of each channel at any width. Set the width of the channel to be displayed as % out of the 100% width of the display graph.

Display Position
Set the position of the channel to be displayed as % out of the 100% width of the display graph.

Scale Setting
Set the upper limit/lower limit value of display for the display width of each channel as an input value or a physical conversion value.

X-Y Display

An X-Y graph can be drawn by specifying 4 channels for the X-axis and 4 channels for the Y-axis. The graph can be displayed a large single graph, or devided four graphs for the each X and Y axis channels. The pen can also be moved up or down, and the grid can be turned on or off.
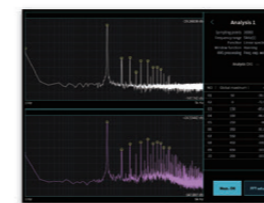
Single Graph Display
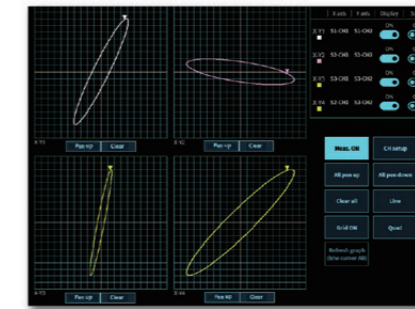
4 Graph display

FFT Analysis

FFT analysis is performed for any two signals. The top 10 highest values can be read from the analysis results, and the value of any analysis result can be read using the cursor. (FFT analysis can be performed on normal data recorded in SSD.)

Data selection	Select from the input signal or recorded data
Sampling	1000, 2000, 5000, 10,000
Maximum analysis frequency	1/2 times of the sampling frequency
Number of displayed graphs	1 graph, 2 graphs Y-T waveform display is also possible.
Functions	Time-Axis waveform, Linear Spectrum, RMS Spectrum, Power Spectrum, 1/1 Octave, 1/3 Octave, Transfer Function, Cross-Power Spectrum, Coherence Function
Window Functions	Hanning window, Hamming window, Rectangular window
Average processing	Time axis simple addition average, Frequency axis simple addition average, Frequency axis exponent weighted average, Frequency axis peak hold
X-axis scale	Time, Linear frequency, Log frequency, 1/1 octave, 1/3 octave
Y-axis scale	Real value area, Imaginary number area, Amplitude, Logarithmic amplitude, Auto scale or manual scale in accordance with the phase analysis results

High-speed and High-definition printing

Recording at high speed (100mm/s) and high recording density (80 dots/mm: 25 mm/s) is possible.The number of signals that can be recorded at the same time is 48 ch.In addition to the signal, the recording name, measurement start time, trigger mark, recording speed, etc. can be printed.
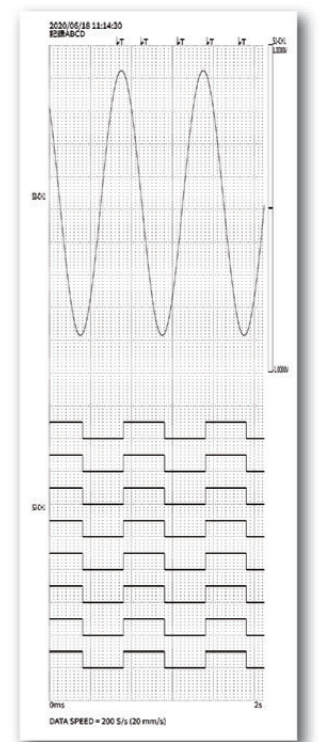
Measurement Mode Selection

Nine measurement patterns are prepared as measurement modes.
"Measurement Mode" can be selected from Measurement starts by manual operation, Measurement starts from a trigger signal or Repeating measurement, etc. When "Measurement Mode" is selected, the necessary set-up menu is displayed and can be easily set.
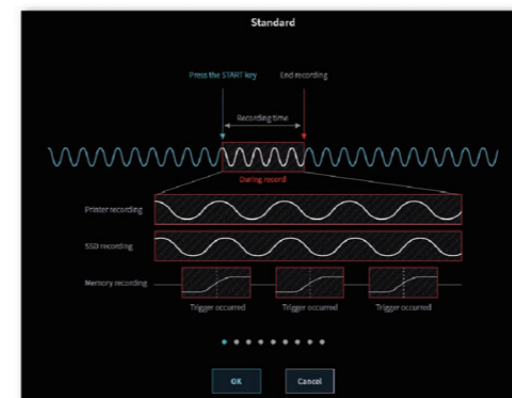
1 Normal record

2 Start time

3 Start trigger

4 Interval time (N times)

5 Start time + Start trigger

6 Start time + Interval time (N times)

7 Start trigger + Interval time (N times)

8 Start time + Start trigger + Interval time (N times)

9 Window recording

Input Module and Peripheral Option Selection Guide

Input Signal — Probes and Cables

Voltage

±500V (DC or AC peak)
Isolated BNC cable (Alligator clip) RA30-507

Current

High current
AC/DC clamp meter 2009R (Kyoritsu)
• 2,000A, 400A
• DC, 30 to 1kHz
• Φ55

Medium current / Low current
Clamp Sensor 8115 (Kyoritsu)
• 130A AC, 180A DC
• DC, 40 to 1kHz
• Φ12

Clamp Adaptor 8112 (Kyoritsu)
• 20A, 2A, 0.2A
• 40 to 10kHz
• Φ8

BNC-Safety jack adapter 0243-3021

Voltage fluctuation

±10% and ±20% of 100V type or 200V type
AC Voltage Level Detector 1540S/1543S
This unit detects voltage fluctuations of power line. ±10% and ±20% of 100VAC or 200 VAC lines can be detected

Voltage detection

50VAC to 250VAC / 20V to 250VDC
AC/DC Voltage Detector 1539S
This unit detects AC or DC voltage and outputs as High/Low. It supports 4 channels
50 to 150 VAC: Low
100 to 250 VAC: High
20 to 150V DC: Low
80 to 250V DC: High

8ch Logic input cable (round type connector converter) RA30-503

Logic

At voltage input, contact input
8ch Logic cable (IC clip) RA30-501
8ch Logic cable (Alligator clip) RA30-502
MDR20 Pole terminal block AX-PCX-10S20
Terminal block connection cable RA30-504

Input Signal — Transducer

Temperature

Thermocouple K, E, J, T, N, R, S, B, C / RTD Pt100, Pt1000
Covered and sheathed thermocouples
Temperature sensor connection connector RA30-555

Vibration (impact acceleration)

Amp-embedded charge accelerometer SV2000 series

Piezoelectric accelerometer SV1000, 9F series
Charge converter
This unit is necessary when piezoelectric accelerometers are used.
AP11-901 AP11-902 AP11-903

Strain, load, displacement, acceleration, and torque

Strain gauge
Bridge box 5370A 5373A
Strain gauge sensors: Load cell, Pressure transducer, Displacement transducer, Torque transducer, Slip ring and Accelerometer

Input Module

2ch Voltage module RA30-101
Input module to measure voltage with anti-aliasing filters
• A/D: 16bit
• 1MS/s (1µs)
• ±100mV to ±500V

4ch Voltage module RA30-102
Input module to measure multi-channel voltage
• A/D: 16bit
• 1MS/s (1µs)
• ±1V to ±200V

2ch High-speed voltage module RA30-103
Input module to measure high-speed voltage
• A/D: 14bit
• 20MS/s (50ns)
• ±100mV to ±500V

2ch Temperature module RA30-106
Input module to measure temperature with a thermocouple and RTD
• A/D: 16bit
• Thermocouple (K, E, J, T, N, R, S, B, C)
• RTD (Pt100, Pt1000)
• Update rate: 1.5ms, 100ms, 1s

16ch Logic module RA30-105
Input module that records voltage H, L or contact open / close
• Number of input: 16 logic inputs
• 1µs
• Input : Voltage or contact

Charge Amplifier AG3103
This amplifier is capable of measuring acceleration, speed, and displacement by connecting an acceleration transducer (charge output type and voltage output type) as a sensor.

AC Strain Amplifier AS1603, AS1703, AS1803R
Strain amplifier (AC bridge type) that is strong against external noise. Ideal for measurement using strain gauges.

DC Strain Amplifier AS2503, AS2603
Optimal for measurements using strain-gauge transducers due to its excellent non-linearity and high-response frequencies.

omniace RA3100

Main Unit

Control Module

Remote control module RA30-112

Start/stop, mark printing, paper feed, external sampling by external signal, and external trigger signal input and trigger signal output.

Control Cable

Remote control cable (among main units) RA30-505

Remote control input cable (loose wire) RA30-506

MDR20 Pole terminal block AX-PCX-10S20
Terminal block connection cable RA30-504

External Storage Medium

SD Memory card (4GB) RM11-453
SD Memory card (8GB) RM11-454

Z-fold Paper Storage Box

Z-fold Paper Storage Box RA30-551
Including Z-fold paper adaptor RA12-301

Dimensions: H97 x W283 x D371 (mm)
Weight: 4kg or lower

Z-fold paper adaptor RA12-301

Recording Paper

Recording Paper YPS106
220mm × 30m roll paper (5 rolls/box)

Recording Paper (with perforated line) YPS108
220mm × 30m roll paper (5 rolls/box)

Recording Paper (Z-fold paper) YPS112
220mm × 201m Z-fold paper (1 set/box)

Other

Soft Carrying Case RA23-183

Hard Carrying Case with Casters RA30-552

Dimensions:H635 × W450 x D320(mm)
H550 × W450 × D320(mm): Castor wheels not included
Weight: 8.5kg or lower

Basic Specifications

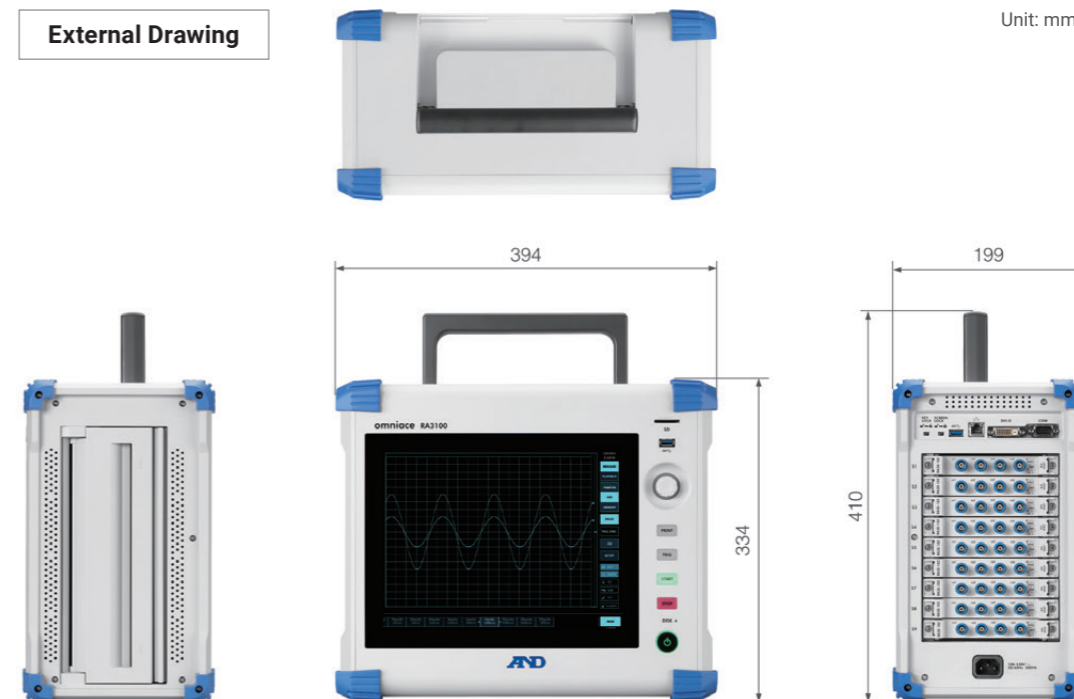|		
Recording Function	Memory Recording	High speed event recording to memory
	SSD Recording	Recording of the input signal to the internal SSD
	Printer Recording	Thermal printing using a thermal head
		*Any combination of memory recording, SSD recording, and printer recording is possible.
Channel	Module Slot	9 slots
	Analog Measurement	Max 36 channels (when 9 pcs 4-channel voltage modules are installed)
	Logic Measurement	Max 144 channels (when 9 pcs 16-channel logic modules are installed)
Sampling Speed	Memory Recording	20MS/s (50ns) to 10S/min
	SSD Recording	1MS/s (1µs) to 10S/min
	Printer Recording	1kS/s (100mm/s) to 10S/min (1mm/min)
Memory Capacity		4GB (2G_points/ch)
Storage Device		Solid State Drive_ (SSD) 256GB
		SD card (supporting SD / SDHC / SDXC) for data storage after recording.
		USB memory using a USB port, for data storage after recording.
Printer	Printing Method	Thermal printing using a thermal head
	Paper Width	219.5mm
	Effective Recording Width	200mm
	Chart Speed	100mm/s to 1mm/min
Trigger	Uses	Trigger for starting record operations (Start Trigger), trigger for memory recording (Memory Trigger).
	Start Trigger	Trigger to start recording operation (selected by manual trigger, external trigger, or measuring channel (arbitrary 1ch))
	Memory Trigger	Trigger to start memory recording (selected by manual trigger, external trigger, or measuring channel (arbitrary 18ch))
	Trigger Source	Input signal (analog/logic), manual trigger, external trigger
	Trigger Detection Method for Measuring Channel	Level trigger, window trigger (memory recording trigger), bit pattern trigger
	Trigger Mode	Set AND/OR for the measuring channel.
	Pre-trigger	0 to 100% (1% step)
	Trigger Mark	The trigger point is indicated with a "T" mark, and the trigger date and hour/minute/second are printed.
	Trigger Filter	Filter duration: 0 to 100 seconds
	External Trigger Input	External signal input (Active Low, High level: 2.1V to 5.0V, Low level: 0V to 0.5V, Pulse width : at High-speed response: 1µs or higher at high level, 1µs or higher at low level / at Normal response: 10 µs or higher at high level, 10µs or higher at low level / at Low response: 10ms or higher at high level, 10ms or higher at low level)
	Trigger Output	Output signal when trigger conditions are met (Active Low, H: 3.8V or higher, L: 0.5V or less, Pulse width: 1µs at high speed response, 10µs at normal response, 10ms at low-speed response)
Monitor	Y-T Waveform Monitor	Display amplitude waveform of measuirng signal during time changes.
	X-Y Waveform Monitor	Input signal 1 is protted in the X axis and input signal 2 is protted in the Y axis to display correlation of those signals.
	FFT Analysis Monitor	FFT analysis of the measuring signals of any two channels is performed, and the analysis results are displayed in the frequency axis.
Display		12.1-inch XGA TFT color LCD (1024 x 768 pixels) with capacitive touch panel
Operation Section	Operation Panel Key	POWER — Power ON/OFF START — Start of measurement STOP — End of measurement TRIG — Manual trigger PRINT — Start of Printer Recording/Screen Copy
	Rotary Knob	Change of the measuring range, waveform position, etc.
Interface	LAN	1000BASE-T (1Gbps) — For control with communication command
	COM	RS-232C — For control by communication command
	USB	Ver. 3.0 2 port — For storage devices (USB memory)
	Video Output	DVI-D — Digital output for external display
Compliance Standards	Safety	IEC 61010-1, IEC 61010-2-30 Overvoltage category (installation category) II Measurement category : Depends on the specifications of each input module.
	EMC	EN61326-1 ClassA
Operating Enviroment	Temperature	0 to 40˚C
	Humidity	35 to 85 %RH (without condensation)
Storage Environment	Temperature	-20 to 60˚C
	Humidity	20 to 85%RH (without condensation)
Vibration Resistance	Random Vibration Durability Test	Frequency: 5 to 500Hz, Acceleration: 6.5m/S² on X-axis and Y-axis, 10.2m/S² on Z-axis
	Sine Wave Vibration Durability Test	Frequency: 10 to 55 Hz, Acceleration: 20.0m/S², 20 cycles for each of the three axes
Backup Battery Life (for Clock Backup)		Approx.10 years (at the surrounding temperature is 25˚C)
Power Consumption		Power-supply voltage: 100 to 240VAC, frequency 50/60Hz Power Consumption: 300VA or less (under the maximum load conditions), 80VA when recording is stopped, 5VA during standby
Dimensions		394(W) × 334(H) × 199(D) mm *excluding projections
Weight		9.5kg or less (main body only),

Recording Function Specifications

Memory Recording	Function	After data is recorded to the internal memory at the set sampling rate, the data is automatically saved to the SSD.	
	Channel	Analog measurement — Max. 36 channels (with 9 pcs 4-channel voltage modules are used) Logic measurement — Max. 144 channels (with 9 pcs 16-channel logic modulea are used)	
	Memory Capacity	4GB (2G points/ch)	
	Data Type	Normal data	
	Memory Division	1 to 200 Div. (The maximum value changes depending on the channel used and recording length)	
	Number of data	2000 to 2G point/ch (1-2-5 step: The maximum value changes depending on the channels and division number used)	
	Sampling Speed	20MS/s (50ns) to 10S/min (1.67µs), Max. 18ch for 20MS/s when simultaneous measurement	
	Maximum Recording time	100 days	
	Recording Operation	by START/STOP button for Time recording, Interval recording, and START trigger recording	
SSD Recording	Function	The measurement data of the input signal is directly recorded to the internal SSD.	
	Channel	Analog measurement — Max. 36 channels (with 9 pcs 4-channel voltage modules are used) Logic measurement — Max. 144 channels (with 9 pcs 16-channel logic modulea are used)	
	Data Logging Capacity	Internal SSD (256GB)	
	Data type	Normal data and peak data selectable	
	Sampling Speed	1MS/s (1µs) to 10S/min (1.67µs), Max. 500kS/s in case of peak data	
	External Synchronization Sampling	Synchronous clock: 250 kHz or less	
	Maximum Recording time	100 days	
	Recording Operation	by START/STOP button for Time recording, Interval recording, START trigger recording, window recording	
	Window Recording	The data is recorded in the ring buffer area (max. 2G point/ch) specified as the window recording time. When the data is exceeded the data areea, overwrite from the top the data area and record all data up to the end of measurement. SSD recording can not be used with memory recording and printer recording at the same time. The data format is normal data.	
Printer Recording	Function	Outputs the input signal directly to the printer (waveform output).	
	Paper Width	219.5mm	
	Effective Recording Width	200mm	
	Recording Operation	by PRINT button: Direct waveform recording to chart paper without saving any data. Chart speed and measuring range can be changed during recording. by START/STOP button for Time recording, Interval recording, START trigger recording:Waveform recording on the chart paper while saving the data to the SSD. Playback and copy is possible after recording.	
	Number of Recording Channels	Max. 48 channels per sheet, Measuring channels can be divided in 3 sheets.	
	Data Type	Peak data	
	Chart Speed	100 mm/s (1 kS/s) to 1 mm/min (10 S/min), User Default Setting enabled. Max. 50mm/s (500Hz) at external synchronization	
	Printing Density	Amplitude axis: 8 dots/mm Time axis: 80 dots/mm (at 25mm/s), 40 dots/mm (50mm/s and higher), 20 dots/mm (100mm/s and higher), 40 dots/mm (at external synchronization)	

Monitor Specifications (on recording and replay)

Y-T Waveform	Recording Function	Displays during memory recording, SSD recording, and printer recording
	Supported Data Type	Normal data, Peak data
	Number of Sheets (Screen)	Max. 48 channels per sheet (screen), Measuring channels can be divided in 3 sheets (screen).
	Displayed Graphs	1 graph
	Grid Count	Vertical: 20 div., Horizontal: 20 div.
	Time Axis Data Count	100 data/div
	Display Function	Numeric display, Signal Name, Amplitude Axis Scale, Recording Time, Trigger Mark, Cursor, Thumbnail
	Display Width	The signal of each channel is displayed at an arbitrary width (Set by % as the full display graph width is 100%)
	Display Position	Display the signal of each channel at any position (Set by % as the full display graph width is 100%)
	Scale Setting	Set the upper limit/lower limit values as input values or physical conversion values for each display width.
	Logic Waveform Display	16ch logic waveform display position movable
X-Y Waveform	Recording Function	Displays during SSD recording
	Supported Data Type	Normal data
	Sampling Rate	1KS/s or less
	Displayed Graphs	1 graph (up to 4 concurrent waveforms), 4 graphs (1 waveform per graph)
	Grid Count	Vertical: 20 div., Horizontal: 20 div.
	Display Function	Draw X-Y waveform with dots or lines in X-axis/Y-axis scale, pen up/down setting available.
	Scale Setting	Set the max/min scale values as input values or physical conversion values for each graph.
	Locas	ON/OFF of locas enabled (pen up & down)
	Printing	Print the plotted X-Y waveform with the printer
FFT Analysis	Recording Function	Display during SSD recording
	Supported Data Type	Normal data
	Sampling Points	1,000, 2,000, 5,000, or 10,000 points
	Sampling Speed	1MS/s or less
	Max Analysis Frequency	1/2 times of the sampling frequency
	Displayed Graphs	1 graph, 2 graphs. The Y-T waveform can also be displayed
	Function	Time axis waveform, Linear spectrum, RMS spectrum, Power spectrum, Power spectrum dencity, 1/1 octave analysis, 1/3 octave analysis, Cross power spectrum, Transfer function, Coherence
	Window Function	Hanning, Hamming, Rectangular
	Average Processing	Time axis simple addition average, Frequency axis simple addition average, Frequency axis exponentially weighted average, Frequency axis peak hold or off
	Number of Averaging	1 to 10
	X-axis Scale	Time, Linear Frequency, Log Frequency, 1/1 Octave, 1/3 Octave
	Y-axis Scale	Real value area, Imaginary number area, Amplitude, Logarithmic amplitude, Phase
	Peak Value Display	Extract the local maximum value or a maximum value of 10 points from the analysis result.

Other Specifications

Recording Mode		There are nine selectable measurement modes. Normal recording/Start time/START trigger/Interval time (N times)/Start time + START trigger/Start time + Interval time (N times)/START trigger + Interval time (N times)/Start time + Interval time (N times)/Window recording
Playback Processing	Scaling	The display position can be changed with pinch-in, pinch-out scaling, zooming, and swiping.
	Cursor	Y-T: Measured value at the cursor position Time display between cursors, Max/Min value/Average value FFT: Cursor position frequency and pulse amplitude
	Back Scrolling	Measured data can be monitored while recording by pressing the [PAUSE] button.
Printer Section	System Annotations	Measurement start time, Recording name, Trigger condition (Trigger point, Trigger date, Trigger time) Sampling speed, Chart speed, Time axis, etc. are printed at the same time as waveform recording
	Mark Print	Printing marks (date/time) on the chart paper or the data on SSD
	Header, Footer, and Page Annotations	Any character can be printed before, during, or after the waveform area during printing (Up to 60 characters horizontally and 86 lines vertically)
	Screen Copy	Print screen image on chart paper
Screen Image Saving		Save screenshots in PNG format (color) on the main unit or on a storage medium
Save/Readout of Settings		Save settings (input and main unit setting conditions) on SSD Measuring conditions saved in the SSD can be read out.
Keylock Function		• Lock operation panel keys • Lock the touch panel
Backlight Auto OFF		Select from OFF/1 minute/5 minutes/10 minutes/30 minutes/60 minutes.
Monitor Brightness		Adjustable
Physical Value Conversion		Physical conversion of input signals, Change of full scale on display, Registration of units.

Remote Control Module RA30-112 Specifications

Input Connector		Half-pitch 20-pin connector
Output Connector		Half-pitch 14-pin connector
External Input		Function: Control by external signal.
	Control Signal	START/STOP, MARK, FEED, PRINT, TRIG
	Input Level	High level: 2.1V to 5.0V, Low level: 0V to 0.5V (active low)
	Response Speed	Select from High-speed/Normal/Low-speed
	Effective Pulse Width	High-speed response: 1µs or higher during high interval, 1µs or higher during low interval Normal response: High interval 1ms or higher, Low interval 1ms or higher Low-speed response: 10ms or higher during high, 10ms or higher during low-speed response
	Max. allowable Input Voltage	30V
External Output		Function: Control signals can be externally output
	Control Signal	START/STOP, MARK, FEED, PRINT, TRIG
	Output Level	High level: 3.8V to 5.0V, Low level: 0V to 0.5V (active low)
	Output Pulse Width	START/STOP, FEED, PRINT: Active output during operation TRIG, MARK: High-speed response: 1 µs/Normal response: 1 ms/Low-speed response: 10 ms
External Sampling Input (EXT.SMPL IN)		Synchronization via external clock signal is possible (simultaneous SSD recording and printer recording are not possible.)
	Input Level	High level: 2.1V to 5.0V, Low level: 0V to 0.5V
	Effective Pulse Width	High-speed (SSD Recording): 2µs or higher/Low-speed (Printer Recording):1ms or higher
	Maximum Input Frequency	High-speed (SSD Recording): 250 kHz/Low-speed (printer recording): 500Hz
External Sampling Output (EXT.SMPL OUT)		Synchronization clock signal can be output externally
	Output Level	High level: 3.8V to 5.0V, Low level: 0V to 0.5V (active low)
Reference Clock for Calibration		Function: Clock output for operation check
	Output Level	0V to 5V (±1%)
	Output Frequency	1kHz (±1%)
	Duty Ratio	50% (±5%)
Withstand voltage		AC300V, 1 minute (between input/output and main chassis)
Maximum Rated Voltage to Ground		AC, DC42V
Dimensions		Approx. 140 (input-side W) x 223(D) x 20(H) mm
Weight		Approx. 250g
Compliance Standards		Safety: IEC61010-1 EMC: IEC61326-1, class A

External Drawing

Unit: mm

394

334

199

410

Input Module Specifications

2ch Voltage Module RA30-101

Input Channels	2ch
Input Connector	Isolated BNC connector
Input Type	Isolated unbalanced input, (Isolation between each channel, between each channel and main chassis
Input Coupling	AC, DC, and GND coupling
Input Impedance	1MΩ
Measurement Range (RANGE)	±100, 200, 500 mV, 1, 2, 5, 10, 20, 50, 100, 200, 500V
Measurement Accuracy	±0.3% of range (23°C ±5°C, DC coupling, LPF 3Hz, after offset)
Temperature Coefficient	± (400ppm of range)/°C
Frequency Response	DC coupling: DC to 100kHz (-3dB to +1dB) (with LPF, AAF OFF) AC coupling: 0.3Hz to 100kHz (-3dB to +1dB) (with LPF, AAF OFF)
Low-pass Filter (LPF)	Cutoff frequency: 3Hz, 30Hz, 300Hz, 3kHz, OFF (-1.6dB±1dB) Characteristics: 2 pole Bessel type
Anti-aliasing Filter (AAF)	Cutoff frequency: 20,40,80,200,400,800,2k,4k,8k,20k,40kHz, OFF Attenuation: -66dB or less at 1.5 times of cutoff frequency
A/D Converter	A/D resolution: 16bit, Sampling rate: 1MS/s (max)
Allowable Input Voltage	±500V peak
Maximum Rated Voltage To Ground	300V AC/DC CATII
Withstand Voltage	3kVAC, 1 minute (between input terminal and main chassis or between each channel)
Dimensions	Approx. 140 (input-side W) x 223(D) x 20(H) mm
Weight	Approx. 300g
Compliance Standards	Safety: IEC61010-1, IEC61010-2-30 (Measurement Category CATII, Contamination level 2), EMC: IEC61326-1, class A

4ch Voltage Module RA30-102

Input Channels	4ch
Input Connector	Isolated BNC connector
Input Type	Isolated unbalanced input, (Isolation between each channel, between each channel and the main chassis)
Input Coupling	DC and GND coupling
Input Impedance	1MΩ or higher
Measurement Range (RANGE)	±1, 2, 5, 10, 20, 50, 100, 200V
Measurement Accuracy	±0.2% of RANGE (23°C ±5°C , DC coupling, LPF 3 Hz, after offset)
Temperature Coefficient	±(400ppm of range)/°C
Frequency Response	DC coupling: DC to 100kHz (-3dB to +1dB) (with LPF OFF)
Low-pass Filter (LPF)	Cutoff frequency: 3Hz, 30Hz, 300Hz, 3kHz, OFF (-1.6dB±1dB) Characteristics: 2 pole Bessel type
A/D Converter	A/D resolution: 16bit, Sampling rate: 1MS/s (max)
Allowable Input Voltage	±200V peak
Maximum Rated Voltage to Ground	300V AC/DC CATII
Withstand Voltage	3kV AC, 1 minute (between input terminal and main chassis or between each channel)
Dimensions	Approx. 140 (input-side W) x 223(D) x 20(H) mm
Weight	Approx. 320g
Compliance Standards	Safety: IEC61010-1, IEC61010-2-30 (Measurement Category CATII, Contamination level 2), EMC: IEC61326-1, class A

2ch High Speed Voltage Module RA30-103

Input Channels	2ch
Input Connector	Isolated BNC connector
Input Type	Isolated unbalanced input, (Isolation:between channels, between each channel and chassis)
Input Coupling	AC, DC, and GND coupling
Input Impedance	1MΩ or higher
Measurement Range (RANGE)	±100, 200, 500mV, 1, 2, 5, 10, 20, 50, 100, 200, 500V
Measurement Accuracy	± 0.5% of RANGE (23°C ±5°C , DC coupling, LPF 5 Hz, after offset)
Temperature Coefficient	± (500ppm of range)/°C
Frequency Characteristics	DC coupling: DC to 5MHz (-3dB to +1dB) (with LPF OFF) AC coupling: 6Hz to 5MHz (-3dB to +1dB)(with LPF OFF)
Low-pass Filter (LPF)	Cutoff frequency: 5Hz, 50kHz, 500kHz, OFF (-3dB±1dB)
A/D Converter	A/D resolution: 14bit, Sampling rate: 20MS/s (max)
Common Mode Rejection Ratio	80dB or higher (50/60Hz)
Allowable Input Voltage	500V peak
Maximum Rated Voltage to Ground	300V AC/DC CATII
Withstand Voltage	3kV AC, 1 minute (between input terminal and main chassis or between each channel)
Dimensions	Approx 140(input-side W) x 223(H) x 20(D) mm
Weight	Approx. 300g
Compliance Standards	Safety: IEC61010-1, IEC61010-2-30 (Measurement Category CATII, Contamination level 2), EMC: IEC61326-1, class A

16ch Logic Module RA30-105

Input Channels	16ch
I/O Connector	8ch x 2 ports
Input Type	Single input, common input (non-isolated), isolated between input signal and main chassis
Voltage Detection	Input range: 0 to 24V Threshold value: 1.4V (±0. 4V)/2.5V (±0.5V)/4V (±0.6V) (selectable from 3 levels) Input Impedance: 1MΩ ±1%

Contact Detection	Threshold (selectable from below 3 levels)
	    Short-circuit (High level): 250 Ω or less/Open (Low level): 2kΩ or more
	    Short-circuit (High level): 1.5kΩ or less/Open (Low level): 5kΩ or more
	    Short-circuit (High level): 3kΩ or less/Open (Low level): 9kΩ or more
	Load current: 0.5mA (typ.) at load resistance 0 to 18kΩ

Responsive Pulse	2μs or higher
Allowable Input Voltage	30V DC
Maximum Rated Voltage to Ground	42V AC/DC
Withstand Voltage	300V AC, 1miute (between input terminal and main chassis)
Power Output for Options	For connecting our probe
Dimensions	Approx. 140 (input-side W) x 223(D) x 20(H) mm
Weight	Approx. 250g
Compliance Standards	Safety: IEC61010-1, EMC: IEC61326-1, class A

2ch Temperature Module RA30-106

Input Channels	2ch		
Input Connector	Sensor Cable Connection Screw Connector		
Input Type	Isolated unbalanced input (isolation: between channels, between each channel and chassis)		
Input Impedance	5MΩ or higher		
Adaptive Sensor	Thermocouple: K, E, J, T, N, R, S, B, C (JIS C1602:2015) Resistance temperature detector (RTD): Pt100, Pt1000 (JIS C1604:2013)		
A/D Converter	A/D resolution: 16bit Data update rates: high speed (1.5ms), normal speed (100ms), low speed (1s)		

Thermocouple

Cold Junction Compensation	Internal/external switching type
Internal Cold Junction Compensation Temp.	±1°C (23°C ±5°C), ±1.5°C (overall temperature range)
Disconnection Detection	ON/OFF switchable

Measurement Range/Accuracy	T/C Type	Measurement Range (RANGE)	Measuring range (°C)	Measurement Accuracy
	K	200°C	-200 to 200	-200 to 0°C±(0.1% of RANGE +2°C) 0 to 1370°C±(0.1% of RANGE +1°C)
		600°C	-200 to 600	
		1370°C	-200 to 1370	
	E	200°C	-200 to 200	-200 to 0°C±(0.1% of RANGE +2°C) 0 to 1000°C±(0.1% of RANGE +1°C)
		600°C	-200 to 600	
		1000°C	-200 to 1000	
	J	200°C	-200 to 200	-200 to 0°C±(0.1% of RANGE +2°C) 0 to 1100°C±(0.1% of RANGE +1°C)
		400°C	-200 to 400	
		1100°C	-200 to 1100	
	T	100°C	-100 to 100	-200 to 0°C±(0.1% of RANGE +2°C) 0 to 400°C±(0.1% of RANGE +1°C)
		200°C	-200 to 200	
		400°C	-200 to 400	
	N	200°C	-200 to 200	-200 to 0°C±(0.1% of RANGE +2°C) 0 to 1300°C±(0.1% of RANGE +1°C)
		600°C	-200 to 600	
		1300°C	-200 to 1300	
	R	200°C	0 to 200	0 to 400°C±(0.1% of RANGE +3.5°C) 400 to 1760°C±(0.1% of RANGE +3°C)
		1000°C	0 to 1000	
		1760°C	0 to 1760	
	S	200°C	0 to 200	0 to 400°C±(0.1% of RANGE +3.5°C) 400 to 1760°C±(0.1% of RANGE +3°C)
		1000°C	0 to 1000	
		1700°C	0 to 1700	
	B	600°C	400 to 600	400 to 1800°C±(0.1% of RANGE + 3°C)
		1000°C	400 to 1000	
		1800°C	400 to 1800	
	C	600°C	0 to 600	0 to 400°C±(0.1% of RANGE + 3.5°C) 400 to 2300°C±(0.1% of RANGE + 3°C)
		1200°C	0 to 1200	
		2300°C	0 to 2300	

Temperature Coefficient	(Measurement Accuracy × 0.1)/°C

Resistance Temperature Detector (RTD)

Measurement Type	3-wire type
Measurement Current	0.5mA, 1mA switchable (at Pt100), fixed at 0.1mA (at Pt1000)

Measurement Range	Type	Measurement Range (RANGE)	Measuring range (°C)	Measurement Accuracy
	Pt100	200°C	-200 to 200	-200 to 850°C ± (0.1% of RANGE ±0.5°C)
		400°C	-200 to 400	
		850°C	-200 to 850	
	Pt1000	200°C	-200 to 200	
		400°C	-200 to 400	
		850°C	-200 to 850	

Temperature Coefficient	(Measurement Accuracy × 0.1)/°C
Common Mode Rejection Ratio	100dB (Data update: normal speed, low speed), 80dB (Data update: High speed) at 50/60 Hz, Signal source resistance 100 Ω
Allowable Input Voltage	30V peak
Maximum Rated Voltage To Earth	300V AC/DC
Withstand Voltage	3kV AC, 1 minute (between input terminal and main chassis)
Dimensions	Approx. 140 (input-side W) x 223(D) x 20(H) mm
Weight	Approx. 300g
Compliance Standards	Safety: IEC61010-1, EMC: IEC61326-1, class A
Accessories	Temperature sensor connection connector (RA30-555) 2pcs/sets

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	5,000pC (AP11-901, AP11-902) 50,000pC (AP11-903)
Max Input Charge	Approx 1.6Hz to 50Hz
Max Output Voltage	5Vp-p or less
Drive Voltage	12V to 25V DC
Drive Current	0.5 to 5mA
Rated Noise	20μVrms or less (AP11-902), 100μVrms or less (AP11-901, AP11-903)
Phase	180°
Operating Temperature	-20 to 80°C (AP11-901), -20 to 110°C (AP11-902, AP11-903)
Connector	Input: Miniature connector (10-32UNF) Output: Male BNC terminal (AP11-901) Female BNC connector (AP11-902, AP11-903)
Dimensions	Φ12 x 38 mm (AP11-901), 21Hex x 34 mm (AP11-902, AP11-903)
Weight	Approx. 20g (AP11-901), approx. 65g (AP11-902, AP11-903)

Main Unit & Accessories

Main Unit

Item	Model	Specifications
Omniace	RA3100	Standard accessories: AC power cable × 1, recording paper × 1, paper holder × 1pair, input module slot cover plate × 1 set, quick operation guide × 1, Instruction manual CD-ROM × 1

Input Module

Item	Model	Specifications
2ch Voltage Module *1	RA30-101	Sampling 1 MS/s, Input ±100mV to ±500 V, A/D resolution 16bit, Anti-aliasing filter
4ch Voltage Module *1	RA30-102	Sampling 1 MS/s, Input ±1 V to ±200 V, A/D resolution 16bit,
2ch High Speed Voltage Module *1	RA30-103	Sampling 20 MS/s, Input ±100mV to ±500 V, A/D resolution 14bit
16ch Logic Module *2	RA30-105	Input 16 logics (voltage or contact)
2ch Temperature Module *3	RA30-106	Sampling 1kS/s, Thermocouple/RTD, 2 temperature sensor connectors (RA30-555) included

*1: Use Isolated BNC cable (Alligator clip) RA30-507
*2: Use 8ch Logic cable (RA30-501, RA30-502, RA30-503), cable for connecting the terminal block (RA30-504)
*3: A temperature sensor connector RA30-555 is provided to attach the temperature sensor to the 2ch temperature module.

Control Module

Item	Model	Specifications
Remote Control Module *4	RA30-112	Remote control, TRIG IN and OUT

*4: Use a remote control module cable (RA30-505, RA30-506) to connect the remote control module to other devices.

Signal Input Related Options

Item	Model	Specifications
Isolated BNC Cable (Alligator clip)	RA30-507	2m length with an insulated BNC - safety alligator clip (+red,-black), connected to RA30-101 to 103
8ch Logic Cable (IC clip)	RA30-501	1.7m length for logic input, IC terminal clip (8ch), connected to RA30-105
8ch Logic Cable (Alligator clip)	RA30-502	1.7m length for logic input, electrical terminal clip (8ch), connected to RA30-105
8ch Logic Cable (round type connector converter)	RA30-503	30cm length conversion cable for connection to the RA30-105 from the 1539S
Cable for Terminal Block	RA30-504	2m length, conneced to the RA30-105 or RA30-112, attach the MDR20 terminal block AX-PCX-10S20
Remote Control Cable (to connect between main units)	RA30-505	2m length, connect the RA30-112 to connect with another RA3100 unit each other
Remote Control Cable (withouot another connector)	RA30-506	2m length, connect to the RA30-112 to control the RA3100 main unit
Temperature Sensor Connection Connector	RA30-555	Connector attached to the terminal of temperature sensor connected to the RA30-106, 2 pcs/sets
MDR20 Terminal Block for AD4430C	AX-PCX-10S20	Used as terminal block for IN/OUT of RA30-105, RA30-112 signals
BNC Adaptor	0243-3021	Isolated BNC connector and Safety terminal plug

Options Related to Current and Voltage Measurement

Item	Model	Specifications
AC/DC Voltage Detector	1539S	4 inputs, AC/DC voltage detector that detects presence of selected low or high voltages and outputs Hi/Lo logic signal
Voltage Fluctuation Detector	1540S	Detects 100/120V AC voltage sags & surges exceeding selected 10% or 20% of AC peak value and outputs as pulse
	1543S	Detects 220/240V AC voltage sags & surges exceeding selected 10% or 20% of AC peak value and outputs as pulse
AC/DC Digital Clamp Meter	2009R *5	For high current (2000A, 400A / DC, 40 to 1 kHz), Φ55, 0311-5184 cable required
Clamp Adaptor	8112 *6	For low current (20A, 2A, 0.2A / 40 to 10 kHZ), 0243-3021 BNC adaptor required
AC/DC Clamp Sensor	8115 *6	For low current (AC / 130A, DC / 180A / DC, 40 to 1kHz), Φ12, 0243-3021 required
Signal Input Cable for Clamp Meter	0311-5184 *7	Length: 2m, miniature plug for microphone and insulated BNC connector

*5: Use signal input cable (0311-5184) if connecting output from 2009R to RA3100
*6: Use BNC adaptor (0243-3021) if connecting output from 8112 or 8115 to RA3100
*7: Signal input cable to connect 2009R clamp meter to RA3100 insulated BNC connector

Recording Paper

Item		Model	Specifications
Recording Paper *8	Roll Paper	YPS106	219.5mm × 30m roll paper (5 rolls/box), Drawing No. 0511-3167
	Roll Paper (with perforation)	YPS108	219.5mm × 30m roll paper (5 rolls/box), perforation 300mm pitch, numbering 99 to 01, Drawing No. 0511-3166
	Z-fold Paper	YPS112	219.5mm × 201m Z-fold paper (1 set/box), folding width 300mm pitch, total of 670 sheets, Drawing No. 0511-3182

*8: Quality not assured if paper other than above is used.

Peripheral Options

Item	Model	Specifications
SD memory card 4G	RM11-453	4GB, industrial use (for saving setting conditions & measured data)
SD memory card 8G	RM11-454	8GB, industrial use (for saving setting conditions & measured data)
Z-fold Paper Storage Box	RA30-551	Including Z-fold paper adaptor RA12-301
Z-fold Paper Adaptor	RA12-301	
Dust Cover	RA11-121	
Soft Carrying Case	RA23-183	
Hard Carrying Case with Casters	RA30-552	

Discover Precision

RA31-ADCC-01-CR1-21402GP

A&D Company, Ltd.