

omniace RA3100

DATA ACQUISITION SYSTEM



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.

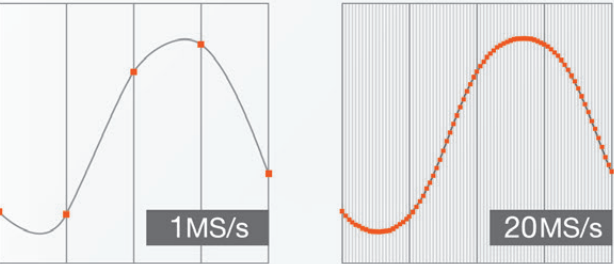
Various Monitor Displays

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

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 capacity

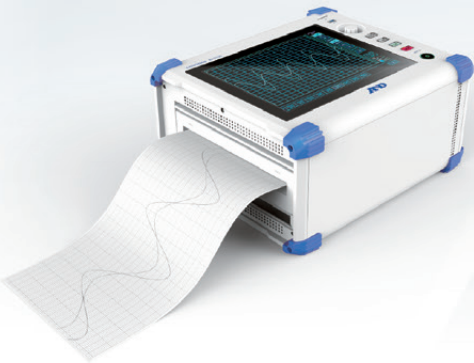
256GB

(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.



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

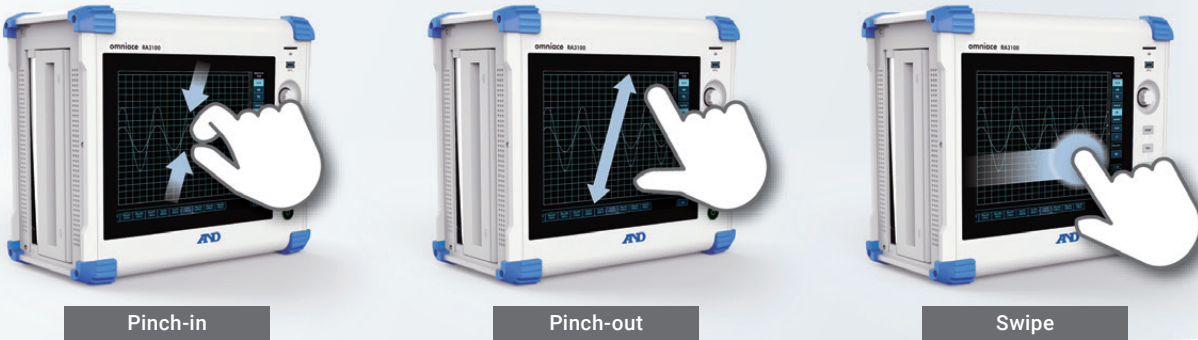
with analog input

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.



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

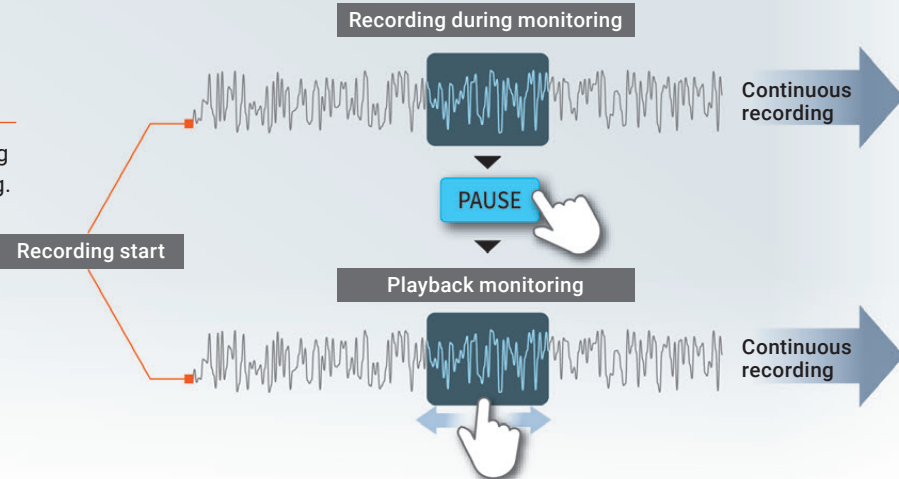
16ch Logic Module

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.



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)

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

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.

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

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.

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)

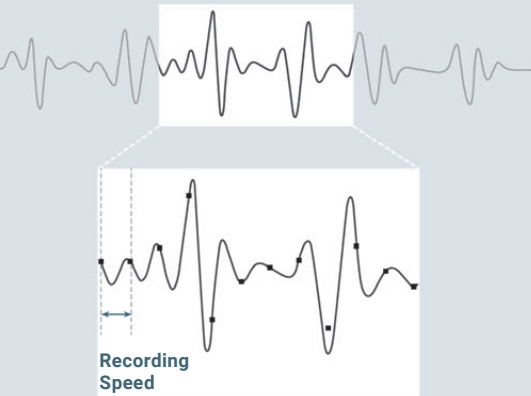
Selectable for SSD Recording

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.

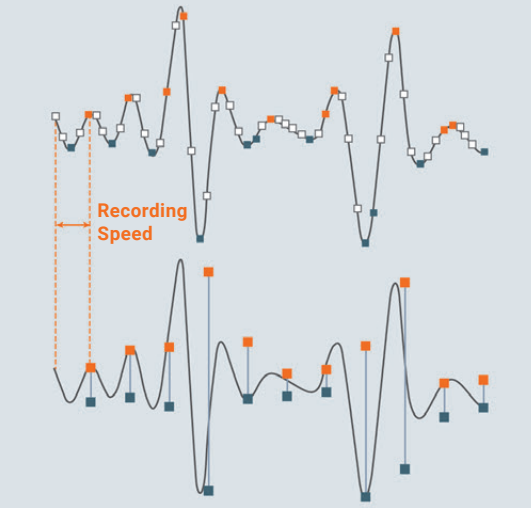
Normal Data

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.



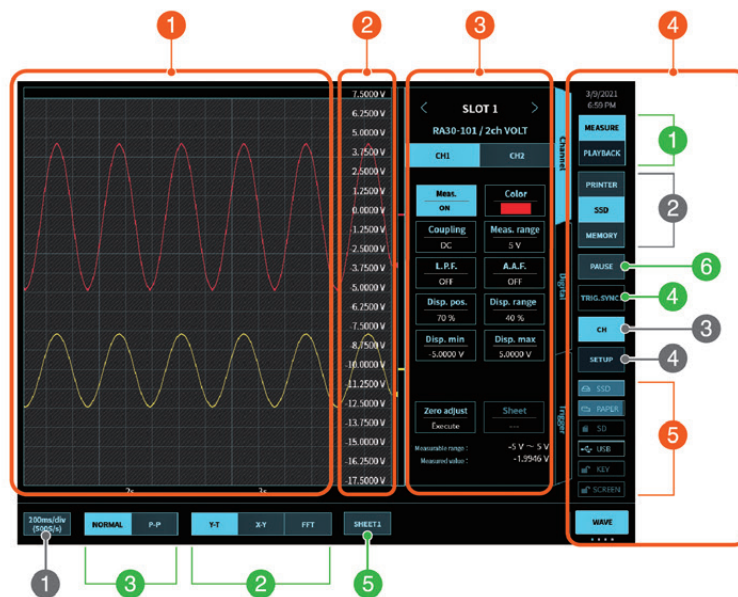
Peak Data

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.



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**

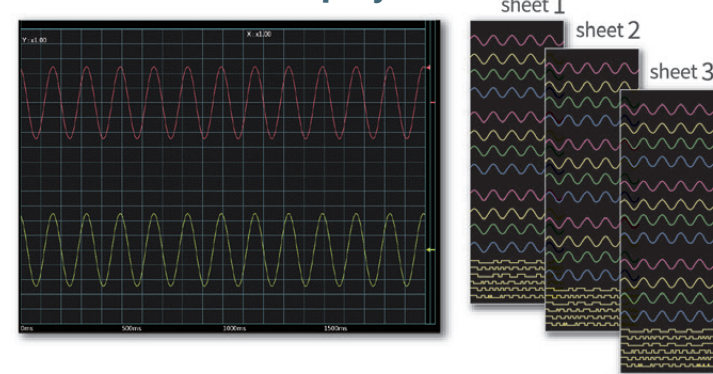
Measurement: Display the current input signal.
Playback: Play back saved data
 - 2 Monitor waveform selection**

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

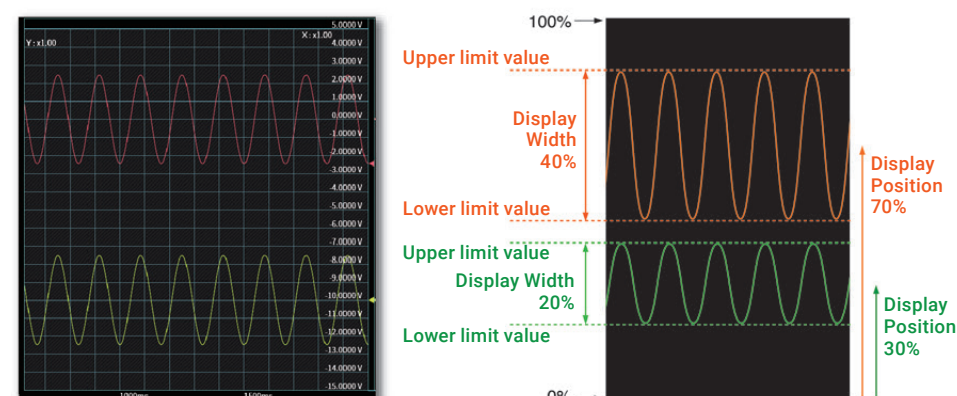


Display the measurement channels split into three sheets.
(Max. 48ch can be registered per sheet)
Monitors up to 48 channels of signals on a graph with
20 divisions in vertical and horizontal.



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.



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

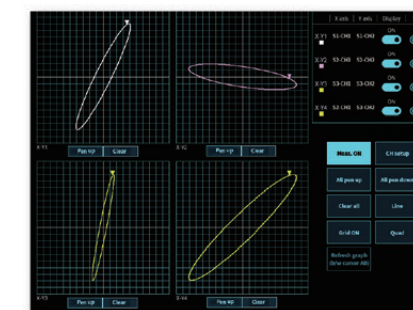
Set the upper limit/lower limit value of display for the display width of each channel as an input value or a physical conversion value.

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 divided 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.



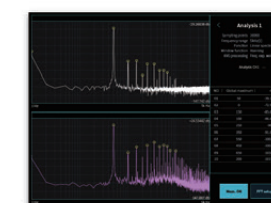
Single Graph Display



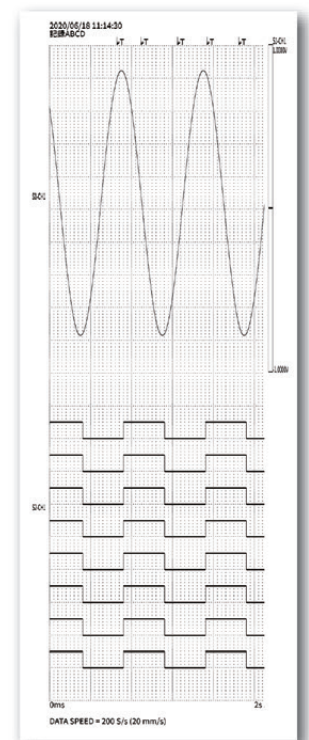
4 Graph display

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



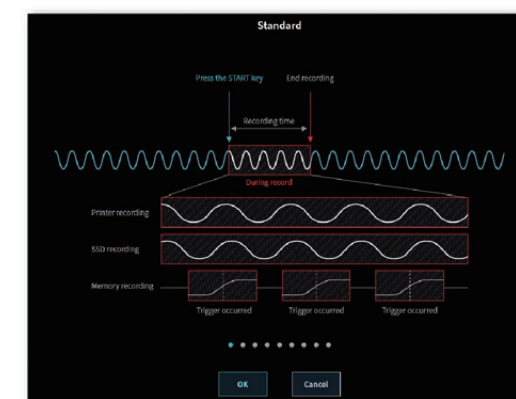
High-speed and High-definition printing

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.



- ```

graph TD
 1[1 Normal record] --> 2[2 Start time]
 2 --> 3[3 Start trigger]
 3 --> 4[4 Interval time
(N times)]
 4 --> 5[5 Start time
+
Start trigger]
 5 --> 6[6 Start time
+
Interval time
(N times)]
 6 --> 7[7 Start trigger
+
Interval time
(N times)]
 7 --> 8[8 Start time
+
Start trigger
+
Interval time
(N times)]
 8 --> 9[9 Window recording]

```

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**

**Voltage**

±500V (DC or AC peak)

**Current**

High current

Medium current

Low current

**Voltage fluctuation**

±10% and ±20% of 100V type or 200V type

**Voltage detection**

50VAC to 250VAC

20V to 250VDC

**Logic**

At voltage input, contact input

**Input Signal**

**Temperature**

Thermocouple K, E, J, T, N, R, S, B, C

RTD Pt100, Pt1000

Vibration (impact acceleration)

Strain, load, displacement, acceleration, and torque

**Probes and Cables**

**Isolated BNC cable (Alligator clip) RA30-507**

**AC/DC clamp meter 2009R (Kyoritsu)**

• 2,000A, 400A

• DC, 30 to 1kHz

Φ55

**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**

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

**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 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.

**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 × D320(mm)

H550 × W450 × D320(mm): Castor wheels not included

Weight: 8.5kg or lower



Product specification

| 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                                                                                                                                                                                                                                                                                                            |  |
| 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                                                                                                                                                                                                                                                                                                                                            |  |
| Trigger              | Chart Speed                                    | 100mm/s to 1mm/min                                                                                                                                                                                                                                                                                                                               |  |
|                      | 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))                                                                                                                                                                                                                        |  |
| Trigger              | 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              | 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              | 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 measuiring 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<br>START — Start of measurement<br>STOP — End of measurement<br>TRIG — Manual trigger<br>PRINT — Start of Printer Recording/Screen Copy                                                                                                                                                                                     |  |
|                      | Rotary Knob                                    | Change of the measuring range, waveform position, etc.                                                                                                                                                                                                                                                                                           |  |
|                      | LAN                                            | 1000BASE-T (1Gbps) — For control with communication command                                                                                                                                                                                                                                                                                      |  |
| Interface            | 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                                                                                                                                                                                                                                                                                                                      |  |
|                      | EMC                                            | Overvoltage category (installation category) II<br>Measurement category : Depends on the specifications of each input module.                                                                                                                                                                                                                    |  |
|                      | Operating Environment                          | Temperature 0 to 40°C<br>Humidity 35 to 85 %RH (without condensation)                                                                                                                                                                                                                                                                            |  |
| Storage Environment  | Temperature                                    | -20 to 60°C                                                                                                                                                                                                                                                                                                                                      |  |
|                      | Humidity                                       | 20 to 85%RH (without condensation)                                                                                                                                                                                                                                                                                                               |  |
|                      | Random Vibration Resistance                    | Frequency: 5 to 500Hz,<br>Accelleration: 6.5m/S <sup>2</sup> on X-axis and Y-axis, 10.2m/S <sup>2</sup> on Z-axis                                                                                                                                                                                                                                |  |
| Vibration Resistance | Sine Wave Vibration Durability Test            | Frequency: 10 to 55 Hz,<br>Accelleration: 20.0m/S <sup>2</sup> , 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),                                                                                                                                                                                                                                                                                                                  |  |

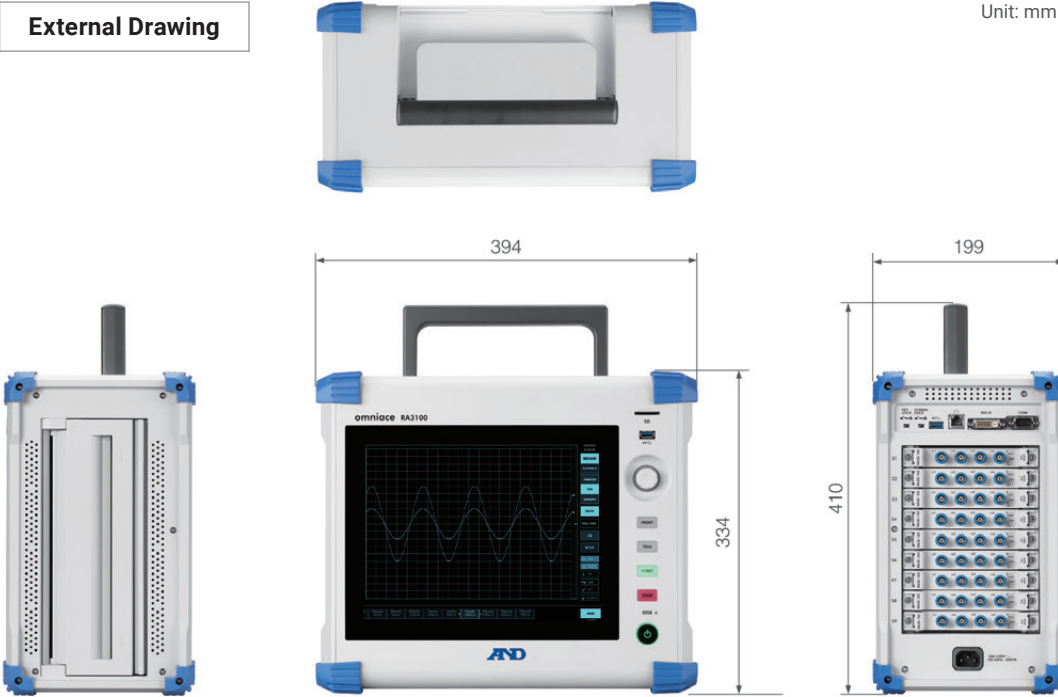
| Recording Function Specifications |                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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                                                                                                                                                                                                                                                                                                                                                             |
| Memory Recording                  | Channel                                                                                                                                                                                                                                                                                                                                                             |
|                                   | Analog measurement —<br>Max. 36 channels (with 9 pcs 4-channel voltage modules are used)<br>Logic measurement —<br>Max. 144 channels (with 9 pcs 16-channel logic modulea are used)                                                                                                                                                                                 |
|                                   | Memory Capacity                                                                                                                                                                                                                                                                                                                                                     |
| Memory Recording                  | Data Type                                                                                                                                                                                                                                                                                                                                                           |
|                                   | Normal data                                                                                                                                                                                                                                                                                                                                                         |
|                                   | Memory Division                                                                                                                                                                                                                                                                                                                                                     |
| Memory Recording                  | 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                                                                                                                                                                                                                                                                                                                                                      |
| Memory Recording                  | Maximum Recording time                                                                                                                                                                                                                                                                                                                                              |
|                                   | 100 days                                                                                                                                                                                                                                                                                                                                                            |
|                                   | Recording Operation                                                                                                                                                                                                                                                                                                                                                 |
| Memory Recording                  | Function                                                                                                                                                                                                                                                                                                                                                            |
|                                   | The measurement data of the input signal is directly recorded to the internal SSD.                                                                                                                                                                                                                                                                                  |
|                                   | Channel                                                                                                                                                                                                                                                                                                                                                             |
| Memory Recording                  | Channel                                                                                                                                                                                                                                                                                                                                                             |
|                                   | Analog measurement —<br>Max. 36 channels (with 9 pcs 4-channel voltage modules are used)<br>Logic measurement —<br>Max. 144 channels (with 9 pcs 16-channel logic modulea are used)                                                                                                                                                                                 |
|                                   | Data Logging Capacity                                                                                                                                                                                                                                                                                                                                               |
| Memory Recording                  | Data type                                                                                                                                                                                                                                                                                                                                                           |
|                                   | Normal data and peak data selectable                                                                                                                                                                                                                                                                                                                                |
|                                   | Sampling Speed                                                                                                                                                                                                                                                                                                                                                      |
| Memory Recording                  | External Synchronization Sampling                                                                                                                                                                                                                                                                                                                                   |
|                                   | Synchronous clock: 250 kHz or less                                                                                                                                                                                                                                                                                                                                  |
|                                   | Maximum Recording time                                                                                                                                                                                                                                                                                                                                              |
| Memory Recording                  | Recording Operation                                                                                                                                                                                                                                                                                                                                                 |
|                                   | by START/STOP button for Time recording, Interval recording, START trigger recording, window recording                                                                                                                                                                                                                                                              |
|                                   | Window Recording                                                                                                                                                                                                                                                                                                                                                    |
| Memory 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 area, 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                                                                                                                                                                                                                                                                                                                                                   |
| Printer Recording                 | Function                                                                                                                                                                                                                                                                                                                                                            |
|                                   | Outputs the input signal directly to the printer (waveform output).                                                                                                                                                                                                                                                                                                 |
|                                   | Paper Width                                                                                                                                                                                                                                                                                                                                                         |
| Printer Recording                 | Effective Recording Width                                                                                                                                                                                                                                                                                                                                           |
|                                   | 200mm                                                                                                                                                                                                                                                                                                                                                               |
|                                   | Recording Operation                                                                                                                                                                                                                                                                                                                                                 |
| Printer Recording                 | 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.<br>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                                                                                                                                                                                                                                                                                                                                        |
| Printer Recording                 | Channels                                                                                                                                                                                                                                                                                                                                                            |
|                                   | Max. 48 channels per sheet, Measuring channels can be divided in 3 sheets.                                                                                                                                                                                                                                                                                          |
|                                   | Data Type                                                                                                                                                                                                                                                                                                                                                           |
| Printer Recording                 | Peak data                                                                                                                                                                                                                                                                                                                                                           |
|                                   | Chart Speed                                                                                                                                                                                                                                                                                                                                                         |
|                                   | 100 mm/s (1 kS/s) to 1 mm/min (10 S/min), User Default Setting enabled.<br>Max. 50mm/s (500Hz) at external synchronization                                                                                                                                                                                                                                          |
| Printer Recording                 | Printing Density                                                                                                                                                                                                                                                                                                                                                    |
|                                   | Amplitude axis: 8 dots/mm<br>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                                                                                                                                                                     |
| Y-T Waveform                                     | Normal data, Peak data                                                                                                                                                                  |
|                                                  | Number of Sheets (Screen)                                                                                                                                                               |
|                                                  | Max. 48 channels per sheet (screen), Measuring channels can be divided in 3 sheets (screen).                                                                                            |
| Y-T Waveform                                     | Displayed Graphs                                                                                                                                                                        |
|                                                  | 1 graph                                                                                                                                                                                 |
|                                                  | Grid Count                                                                                                                                                                              |
| Y-T Waveform                                     | Vertical: 20 div., Horizontal: 20 div.                                                                                                                                                  |
|                                                  | Time Axis Data Count                                                                                                                                                                    |
|                                                  | 100 data/div                                                                                                                                                                            |
| Y-T Waveform                                     | Display Function                                                                                                                                                                        |
|                                                  | Numeric display, Signal Name, Amplitude Axis Scale, Recording Time, Trigger Mark, Cursor, Thumbnail                                                                                     |
|                                                  | Display Width                                                                                                                                                                           |
| Y-T Waveform                                     | 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%)                                                                                   |
| Y-T Waveform                                     | Scale Setting                                                                                                                                                                           |
|                                                  | Set the upper limit/lower limit values as input values or physical conversion values for each display width.                                                                            |
|                                                  | Logic Waveform Display                                                                                                                                                                  |
| Y-T Waveform                                     | 16ch logic waveform display position movable                                                                                                                                            |
|                                                  | Recording Function                                                                                                                                                                      |
|                                                  | Displays during SSD recording                                                                                                                                                           |
| Y-T Waveform                                     | Supported Data Type                                                                                                                                                                     |
|                                                  | Normal data                                                                                                                                                                             |
|                                                  | Sampling Rate                                                                                                                                                                           |
| Y-T Waveform                                     | 1KS/s or less                                                                                                                                                                           |
|                                                  | Displayed Graphs                                                                                                                                                                        |
|                                                  | 1 graph (up to 4 concurrent waveforms), 4 graphs (1 waveform per graph)                                                                                                                 |
| Y-T Waveform                                     | Grid Count                                                                                                                                                                              |
|                                                  | Vertical: 20 div., Horizontal: 20 div.                                                                                                                                                  |
|                                                  | Display Function                                                                                                                                                                        |
| Y-T Waveform                                     | 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.                                                                                              |
| Y-T Waveform                                     | Locas                                                                                                                                                                                   |
|                                                  | ON/OFF of locas enabled (pen up & down)                                                                                                                                                 |
|                                                  | Printing                                                                                                                                                                                |
| Y-T Waveform                                     | Print the plotted X-Y waveform with the printer                                                                                                                                         |
|                                                  | Recording Function                                                                                                                                                                      |
|                                                  | Display during SSD recording                                                                                                                                                            |
| Y-T Waveform                                     | Supported Data Type                                                                                                                                                                     |
|                                                  | Normal data                                                                                                                                                                             |
|                                                  | Sampling Points                                                                                                                                                                         |
| Y-T Waveform                                     | 1,000, 2,000, 5,000, or 10,000 points                                                                                                                                                   |
|                                                  | Sampling Speed                                                                                                                                                                          |
|                                                  | 1MS/s or less                                                                                                                                                                           |
| Y-T Waveform                                     | Max Analysis Frequency                                                                                                                                                                  |
|                                                  | 1/2 times of the sampling frequency                                                                                                                                                     |
|                                                  | Displayed Graphs                                                                                                                                                                        |
| Y-T Waveform                                     | 1 graph, 2 graphs. The Y-T waveform can also be displayed                                                                                                                               |
|                                                  | Function                                                                                                                                                                                |
|                                                  | Time axis waveform, Linear spectrum, RMS spectrum, Power spectrum, Power spectrum density, 1/1 octave analysis, 1/3 octave analysis, Cross power spectrum, Transfer function, Coherence |
| Y-T Waveform                                     | Window Function                                                                                                                                                                         |
|                                                  | Hanning, Hamming, Rectangular                                                                                                                                                           |
|                                                  | Average Processing                                                                                                                                                                      |
| Y-T Waveform                                     | 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                                                                                                                                                                                 |
| Y-T Waveform                                     | X-axis Scale                                                                                                                                                                            |
|                                                  | Time, Linear Frequency, Log Frequency, 1/1 Octave, 1/3 Octave                                                                                                                           |
|                                                  | Y-axis Scale                                                                                                                                                                            |
| Y-T Waveform                                     | 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.                                                                                               |

Remote Control Module Specifications

| 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)                                                                                                                                                                                                       |
| External Input                                | 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<br>Normal response: High interval 1ms or higher, Low interval 1ms or higher<br>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)                                                                                                                                                                                                       |
| External Output                               | START/STOP, FEED, PRINT: Active output during operation                                                                    |                                                                                                                                                                                                                                                                    |
|                                               | Output Pulse Width                                                                                                         | 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                                                                                                                                                                              |
| External Sampling Input (EXT.SMPL IN)         | 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                                                                                                                                                                                                              |
| External Sampling Output (EXT.SMPL OUT)       | 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%)                                                                                                                                                                                                                                                     |
| Reference Clock for Calibration               | 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<br>EMC: IEC61326-1, class A                                                                                                                                                                                                                     |

External Drawing



Unit: mm



## 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)<br>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)<br>Characteristics: 2 pole Bessel type                               |
| Anti-aliasing Filter (AAF)      | Cutoff frequency: 20,40,80,200,400,800,2k,4k,8k,20k,40kHz, OFF<br>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 miute (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)<br>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)<br>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<br>Threshold value: 1.4V (±0.4V)/2.5V (±0.5V)/4V (±0.6V) (selectable from 3 levels)<br>Input Impedance: 1MΩ ±1%                                                                                                                                                                                                |
| Contact Detection               | Threshold (selectable from below 3 levels)<br>Short-circuit (High level): 250 Ω or less/Open (Low level): 2kΩ or more<br>Short-circuit (High level): 1.5kΩ or less/Open (Low level): 5kΩ or more<br>Short-circuit (High level): 3kΩ or less/Open (Low level): 9kΩ or more<br>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)<br>Resistance temperature detector (RTD): Pt100, Pt1000 (JIS C1604:2013) |

|                                       |                                           |                                                                                                                             |                                                              |                                                                           |                                                                         |
|---------------------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------|
| A/D Converter                         |                                           | A/D resolution: 16bit<br>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)<br>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)<br>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)<br>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)<br>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)<br>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)<br>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)<br>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)<br>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<br>± (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),<br>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)<br>0.1mV/pC ±5% (AP11-903)                                                               |
| Max Input Charge                              | 5,000pC (AP11-901, AP11-902)<br>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)<br>Output: Male BNC terminal (AP11-901)<br>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, connectd 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 (without 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 |
|                                                    | 1540S        | Detects 100/120V AC voltage sags & surges exceeding selected 10% or 20% of AC peak value and outputs as pulse          |
| Voltage Fluctuation Detector                       | 1543S        | Detects 220/240V AC voltage sags & surges exceeding selected 10% or 20% of AC peak value and outputs as pulse          |
|                                                    | 2009R *5     | For high current (2000A, 400A / DC, 40 to 1 kHz), Φ55, 0311-5184 cable required                                        |
| AC/DC Digital Clamp Meter                          | 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    |                               |        |                                                                                                                |
|--------------------|-------------------------------|--------|----------------------------------------------------------------------------------------------------------------|
| Recording Paper *8 | Item                          | Model  | Specifications                                                                                                 |
|                    | 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 |                                                                     |





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