The AR4400/AR4800 Analyzing Recorders are multifunctional waveform measuring instruments. They integrate many functions required for the measurement, processing, display, and recording of waveforms in a single unit. The latest technologies, such as a plug-in input unit, a color display, and a magneto-optical disk drive are employed by this recorder.

FEATURES

● Nine kinds of plug-in input units that can be mixed together
  Can be freely combined to match the measurement signals.

● High-speed computation and powerful waveform analysis
  Comes with a program computation, FFT computation, waveform judgment function and waveform parameter measurement function.

● Large capacity data storage and high-speed data transfer
  Comes with SCSI, FDD, GP-IB and RS-232-C interfaces. 230 MB internal MO disk drive (optional)

● Multi-channel operation
  Improved measurement efficiency due to fewer measurement operations.

● Long memory
  Max. 4 M data/channel

● Color display

FUNCTIONS

■ BASIC MEASUREMENT FUNCTIONS

● Simultaneous Measurement of High-speed and Low-speed Phenomena
  The sampling rate can be freely set (up to the maximum sampling rate of the input unit) for each group, thus utilizing the full performance of the input unit and also allowing both high-speed and low-speed phenomena to be measured. Each unit has an A/D converter, enabling measurement to be performed simultaneously. You can also perform sampling using an external clock*1.

*1 For example, the performance of an engine can be evaluated by using the pulses generated in proportion to the engine crank angle as an external clock.

● Long Memory
  The AR4800 comes with a waveform memory that has a maximum capacity of 32 M data. The maximum capacity per channel is 4 M data. By setting the sampling mode to SINGLE or REPEAT, you can acquire a waveform data to a floppy disk, internal MO disk or external medium, as well as to the waveform memory.

● Linear Scaling Function
  If you use an external converter to measure a physical quantity such as displacement, speed, acceleration or pressure, you can directly read the physical quantity using the linear scaling function. The instrument incorporates a function which directly inserts the offset measurement value and the full scale measurement value for the converter into the conversion formula.
ANALYZING RECORDERS

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● A Wealth of Trigger Functions
In the case of a FREE setting, data is acquired as soon as measurement starts. You can set a maximum of 33 analog and 16 logic (702622) trigger sources. There are 7 types of triggers, RISE, FALL, BOTH, WINDOW IN, WINDOW OUT, HIGH and LOW (there are two types of logic triggers, HIGH and LOW). You can set 3 kinds of hysteresis to enable a stable trigger to be applied when the signal contains noise.

■ HIGH-SPEED COMPUTATION AND POWERFUL WAVEFORM ANALYSIS

● Program Computation Using Free Formulas
The program computation function lets you write your own formula, using the four arithmetic operations and also a wide variety of functions such as triangular functions, differentiation, integration, and square root. And the dedicated RISC chip ensures fast processing.

● Multi-channel FFT Analysis
This instrument contains 7 kinds of FFT analysis functions including linear spectrum and transmission functions. You can select the number of analysis points from 1 k, 2 k and 10 k. You can also perform FFT analysis on signals from up to 32 channels, thus allowing simultaneous analysis of vibration and resonance phenomena at various parts of an engine or rotating machine.

● 27 Kinds of Waveform Parameter Functions
In addition to maximum value, minimum value and average which are useful for analog waveform analysis, this instrument features a host of new functions for digital waveform analysis. For example, rise time, fall time, period, and delay time are useful for analyzing a mixture of analog and digital signals.

■ A WIDE VARIETY OF DISPLAY FUNCTIONS
You can display up to 32 waveforms in 8 colors, and display all channels. Display formats include single, dual, quad and octal divided screen displays, an X-Y display, a 2-dimensional array display, a 3-dimensional array display, and also a NYQUIST display for FFT analysis. You can also display time axis measurement data and FFT analysis data simultaneously.

● GO/NO-GO FUNCTION
This function is used to judge waveform parameters of the Measurement function or zones. The results of judgment can be auto-saved, a buzzer tone output, and automatic recording performed.

■ AUTOMATIC SEQUENCE FUNCTION
You can register up to 100 key operations, and automatically repeat these operations. In addition to the keys functions, the instrument allows you to set the pause period from 0.5 second to 5.0 seconds and also to set an inquiry.
LARGE-CAPACITY DATA STORAGE, VARIOUS RECORDING FUNCTIONS

Large-capacity Data Storage
The instrument comes with a floppy disk drive, and can be fitted with an optional internal MO disk drive. You can store up to 230 MB of data on a single MO disk, allowing the entire waveform memory (max. 32 M data) to be stored on a single MO disk. The data file formats are WAVEFORM, which enables stored data to be read by the AR4400/AR4800, ASCII for ASCII data, and AG FORM which stores data in the format of YOKOGAWA's AG series arbitrary waveform generator.

Various Recording Functions
Data can be recorded to the internal printer in four ways: screen hard copy, high resolution recording, analog recording, and digital recording. In the screen hard copy mode, an image displayed on the screen is recorded directly in A5 size to the built-in thermal printer. High resolution recording records waveforms in finer detail. By using analog recording, you can record waveform data over a specified range on a continuous chart with the time axis expanded. Digital recording lets you record data over a specified range as digital values.

In addition, the AR4400/AR4800 can output data to a floppy disk, an internal MO disk, and even as five kinds of image files: HP-GL, PostScript, ThinkJet, TIFF and BMP, via a GP-IB, RS-232-C or SCSI interface. These image files can then be printed using a personal computer to obtain color reports.

The recorder function records measured waveforms in realtime at a chart speed of between 10 mm/h and 25 mm/s.
ANALYZING RECORDERS

AR4400 & AR4800

■ CONNECTION TO PERIPHERAL UNITS
● A Variety of Interfaces
In addition to having an FDD, the instrument comes with SCSI, GP-IB, and RS-232-C interfaces. Data can thus easily be transferred to a PC, or saved on an external hard disk or MO disk by using the SCSI interface. The instrument even has an RGB video output for displaying screen information on a large CRT.

● Using Stored Data
Some kinds of data stored in the AR4400/AR4800 can be used in a PC, so you can paste screen data into a report and then print out the report on a printer. Also, measurement data stored in the ASCII format can be read directly to a PC and then manipulated freely on the PC.

SPECIFICATIONS OF MAIN UNIT

Specifications of Measurement Section

● Input Section
Plug-in input unit type (Each unit contains an A/D converter)
702412: Max. 8 slots (max. 16 channels)
702422: Max. 16 slots (max. 32 channels)

● Memory Section
Waveform memory capacity: Measurement data including measurement conditions
Set the waveform data length per channel in groups units.

<table>
<thead>
<tr>
<th>Group</th>
<th>Data length/channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1, 2, 4, 8, 16, 32, 64, 125, 250 k, 500 k, 1 M</td>
</tr>
<tr>
<td>2</td>
<td>1, 2, 4, 8, 16, 32, 64, 125, 250, 500 k, 1 M</td>
</tr>
<tr>
<td>3</td>
<td>1, 2, 4, 8, 16, 32, 64, 125, 250, 500 k, 1 M</td>
</tr>
<tr>
<td>4</td>
<td>1, 2, 4, 8, 16, 32, 64, 125, 250, 500 k, 1 M</td>
</tr>
</tbody>
</table>

"": Only 2 channels per group can be measured.
"": Only 1 channel per group can be measured.

● Measurement Section
Sampling rate
1 M, 400, 200, 100, 50, 20, 10, 5, 2, 1 k, 500, 200, 100, 50, 20, 10, 5, 2, 1, 0.5, 0.2, 0.1 S/s, or an external sampling clock (However, the maximum sampling rate differs depending upon the plug-in input unit.)
The sampling rate can be set independently for each group.

Time axis accuracy : 0.02 %
Sampling mode : Continuous/Single/Repeat
Auto-save : RAM (waveform memory)/MO (MO disk)/FD (floppy disk)/SCSI (externally connected drive)
Number of repetitive operations : 2 to 3000
Averaging : OFF/Linear/Exponential
Number of averaging operations : 2/4/8/16/32/64/128/256/512/1024/2048/4096/8192
Timer functions : Starting date, time, and interval can be set.

● Trigger
Analog input Trigger mode : FREE/ON (all AND)/ON (all OR)
Pre-trigger : 0 to 100 % (1 % steps)
Trigger source : INT (1 to 32 channels)/EXT

Internal Trigger
Trigger slope : Rise/Fall/HIGH/LOW/WINDOW
Trigger level : -100 to 100 % (1 % steps, INT)
Hysteresis : 0.1 or 5 % of the measuring range
Logic inputs Trigger method : Digital trigger for measurement data in each channel
Trigger source : 8 points × 2
Trigger ON/OFF : Can be set to ON/OFF for each source.
If X, then trigger occurs at any type.
Trigger slope : Select Rise or Fall.
Trigger status : Select from High and Low.

Program Computation Functions

● Program Computation Functions
General functions
Computation data : Raw measurement data, display data
Program computation entry format: Computation entry format depending upon the particular combination of functions
Maximum number of computation formulas : 32
Maximum number of characters in computation formula : 50
Operators : Addition, subtraction, multiplication and division [+,-,×,÷], parentheses [],
Variables : Measurement data, computation data and case data computation results for each channel can be entered in a computation formula.
\[ W1 = CH(1) \]
\[ W2 = CH(2) + W1 \]
Constants : Arbitrary values can be entered in the computation formula.
\[ W1 = 0.123 + CH(1) \]
or, Constants K1 to K8

General functions
Absolute value ABS, square root SQRT, common logarithm LOG, exponential EXP, sine SIN, cosine COS, tangent TAN, inverse sine ASIN, inverse cosine ACOS, inverse tangent ATAN, moving average MEAN, first-order differentiation DDIF, second-order differentiation DDIF, integration INTG, double integration INTG, and logic data extraction
**FFT functions**

- **FFT function entry format**: Only channel Nos. or waveform Nos. can be specified as variables.
- **FFT functions**: Linear spectrum, RMS value spectrum, power spectrum, density function, cross spectrum, transmission function, coherent function.

<table>
<thead>
<tr>
<th>Number of FFT points</th>
<th>1000, 2000, 10000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification of FFT starting point</td>
<td>Possible</td>
</tr>
<tr>
<td>Window functions</td>
<td>Rectangular, Hanning</td>
</tr>
<tr>
<td>Computation loop count function</td>
<td>Function which progressively computes and displays the measurement data a number of times equal to the specified loop count. E.g. In the case of W1 = CH2, L1), if the loop count is 10, the data in channel 2 is displayed 10 times from case data 1 to case data 10, respectively.</td>
</tr>
</tbody>
</table>

**Maximum Length of Waveform Data That can be Computed**

- **Number of FFT computation waves** (When only FFT is computed)
<table>
<thead>
<tr>
<th>Number of FFT Points</th>
<th>Power Spectrum</th>
<th>Linear Spectrum</th>
</tr>
</thead>
<tbody>
<tr>
<td>10000</td>
<td>Max. 32</td>
<td>Max. 32</td>
</tr>
<tr>
<td>10000</td>
<td>Max. 32</td>
<td>Max. 25</td>
</tr>
</tbody>
</table>

- **FFT computation data length**: Total of the data length necessitated by the number of FFT computations and the FFT function.

<table>
<thead>
<tr>
<th>FFT computation data length</th>
<th>Total of the data length necessitated by the number of FFT computations and the FFT function.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total of the data length</td>
<td>For 1 FFT computation of a linear spectrum, RMS spectrum, power spectrum, or density function, the data length is the number of FFT points x 4 data. (For 1 FFT function computation of a cross spectrum, transmission function or coherent function, the data length is the number of FFT points x 8 data.)</td>
</tr>
</tbody>
</table>

**Cursor Measurement Function**

<table>
<thead>
<tr>
<th>Cursor type</th>
<th>Marker</th>
<th>Horizontal</th>
<th>Vertical</th>
<th>H&amp;V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of devices</td>
<td>2 markers</td>
<td>2 horizontal axis cursors</td>
<td>2 vertical axis cursors</td>
<td>2 horizontal axis cursors and 2 vertical axis cursors</td>
</tr>
<tr>
<td>Measurement value</td>
<td>The two markers (Marker) move over the data. They indicate the measurement data, and also the period and values of the computation data.</td>
<td>Cursors other than Marker move over the screen. Measurement takes place with respect to the data on the screen, so the resolution of a measurement value depends upon the screen resolution.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Waveform Analysis Function**

<table>
<thead>
<tr>
<th>Number of Waves to be Computed</th>
<th>Maximum Computation Data Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 to 32 waves</td>
<td>64 K data</td>
</tr>
<tr>
<td>9 to 16 waves</td>
<td>125 K data</td>
</tr>
<tr>
<td>5 to 8 waves</td>
<td>250 K data</td>
</tr>
<tr>
<td>3 or 4 waves</td>
<td>500 K data</td>
</tr>
<tr>
<td>2 waves</td>
<td>1 M data</td>
</tr>
<tr>
<td>1 wave</td>
<td>2 M data</td>
</tr>
</tbody>
</table>

**GO/NO-GO Judgment Function**

<table>
<thead>
<tr>
<th>Kind of waveform judgment</th>
<th>Waveform parameter or zone judgment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time axis waveform</td>
<td>Histo (histogram), P-P (Peak to Peak), Max (maximum value), Min (minimum value), High (amplitude that occurs most frequently), Low (amplitude that occurs least frequently), Avg (average value), Rms (RMS value), Odhs (overdose), Undhs (underdose), Rise (rise time), Fall (fall time), Freq (frequency), Period, +Duty (High duty ratio), -Duty (Low duty ratio), +Width (High pulse width), -Width (Low pulse width), XDelay (x-delay time), FDelay (fall delay time), Middle (mid-value of amplitude), Ampm (amplitude), StdDev (standard deviation), Burst (burst time), Integ1, Integ2, overall (overall value, for measuring power spectrum density only).</td>
</tr>
</tbody>
</table>

**Display Function**

<table>
<thead>
<tr>
<th>Display function</th>
<th>SINGLE screen</th>
<th>DUAL screen</th>
<th>QUAD screen</th>
<th>OCTAL screen</th>
<th>X-Y display</th>
<th>NYQUIST</th>
<th>2-dimensional arrow display/3-dimensional array display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. 30 waves + 16 logic waves displayed in 8 colors</td>
<td>Max. 16 waves for each screen displayed on 2 screens in 8 colors</td>
<td>Max. 8 waves for each screen displayed on 4 screens in 8 colors</td>
<td>Max. 4 waves for each screen displayed on 8 screens in 8 colors</td>
<td>FFT only</td>
<td>Only 1 wave is displayed. Real numbers of a frequency spectrum are displayed on the horizontal axis, and imaginary numbers on the vertical axis.</td>
<td>FFT only</td>
<td>The results of analysis of one wave only are displayed in 2 dimensions or 3 dimensions.</td>
</tr>
</tbody>
</table>
ANALYZING RECORDERS

AR4400 & AR4800

• Accumulation Display Function
  Waveform overwrite
  COLOR : Overwrite takes place in 1 color.
  PERSIST : Overwrite takes place an infinite number of times in 8 colors signifying data frequency information.

Recorder Functions

• Recording
  Recording format : Analog, digital
  Recording trend : Waveform recording on a continuous chart
  Data to be recorded : Measurement data for each channel
  Maximum number of recording channels : 32
  Recording waveform selection :
  Analog : All or a specified part of the measurement data or computation data is recorded.
  Digital : All or a specified part of the measurement data or computation data is printed at the specified interval.

• Time Trigger
  The date and time (hours and minutes) of the start and end of recording can be specified.

Screen Display

• Screen Display
  Display function : Roll mode display
  Maximum number of waves that can be displayed : 32

Monitor Function

This function screen-displays measured data for the channels in which input units are installed.

Monitor formats
  BAR GRAPH : Bar graph display
  DIGITAL : Digital display
  RECORDER : Roll display

Data Saving and Reading Function

Floppy disk, internal MO disk drive (optional), MO disk connected to SCSI. This function saves and reads waveform data (data format, WAVEFORM, ASCII, FLOAT, AG FORAM) and setting data to and from a magnetic disk.

(From the data format of waveform data that can be read by the main unit is limited to WAVEFORM.)

Other Functions

• Scaling : Scaling can be performed for each channel.
• Automatic Sequence Function : Automatic operation takes place in a predetermined sequence.

Display Section

Display :
  8.4" color TFT liquid crystal display

Display screen size :
  171 mm (horizontal) × 130 mm (vertical)

Total number of display pixels: 640 x 480
Number of waveform display pixels : 501 x 385
*: (Liquid crystal display may include defects of about 0.02% of all pixels.)

Memory Mode Recording

• Recording format
  Hard copy :
    A displayed screen can be output directly as A5 size.
    Recording resolution 640 x 480 (same as screen)
  High resolution :
    The screen display is output at high resolution as A4 size.
    Recording density : 8 dots/mm
  Analog :
    All or a specified part of the measurement data or computation data is recorded.
    Recording density : 8 dots/mm
    Time axis resolution : 8 dots/mm
    Recording accuracy : ±0.125 mm (1 dot)
  Digital :
    All or a specified part of the measurement data or computation data is printed at the specified interval.
    Data interval : 1 to 1000

Screen Data Output and Saving Function

Built-in printer
  Outputs a hard copy of the screen.

GP-IB interface :
  Data is output in one of the following file formats:
  RS-232-C interface : HP-GL, PostScript, ThinkJet, TIFF, BMP
  MO disk :
    Data is saved in one of the following file formats:
    HP-GL, PostScript, ThinkJet, TIFF, BMP

External Input/Output Section

• EXT I/O :
  D-Sub 9-pin receptacle
  GO/NO-GO judgment output: Pin No. 5
  Output level : TTL level
  (Upon NO-GO judgment, the level changes from High to Low.)
  Input voltage : TTL level
  Maximum allowable input voltage : ±5 to +10 V
  External trigger output : Pin No. 7
  Output voltage : TTL level
  External clock : Pin No. 9
  Input voltage : TTL level
  Maximum allowable input voltage : ±5 to +10 V

• RGB Video Signal Output
  D-Sub 15-pin receptacle (RGB VIDEO OUT)
  Output format : VGA compatible

GP-IB Interface

Electrical and mechanical specifications :
  Conforms to IEEE Std’d 488-1978 (B5 C 1901-1987).
  Working code : ISO (ASCII) code
  Address : 0 to 30 talker/listener addresses can be set.
  Remote status cancel : Remote status can be canceled with the LOCAL key.

• RS-232-C Interface
  Standard :
    Conforms to EIA RS-232-C.
    Transmission speed : 1200, 2400, 4800, 9600, 19200 bps
    RS-232-C function : Set value input/output, measurement value output, control (excluding Power ON/OFF)
    HP-GL plotter output
  Standard :
    SCPI (Small Computer System Interface), ANSI X3.131-1986
  Connector :
    Half pitch 50-pin
  Connection pin assignment : Unbalanced type (single end)

• HP-GL Plotter Output (Common to GP-IB and RS-232-C Interfaces)

External Media

• Built-in Floppy Disk Drive
  Number of drives : 1
  Capacity :
    640, 720 KB/1,2,1.44 MB (MS-DOS format)

• MO Disk Drive (optional)
  Number of drives : 1
  Capacity :
    230 MB (semi-IBM format)

DC Drive (additional specifications/D2/D3)

Input voltage :
  12 V DC (D2) / 24 V DC (D3)

Allowable input voltage range : 10 to 20 V DC (D2/Both when operating and not operating; Measured at DC power supply connector of main unit.)
21 to 30 V DC (D3/Both when operating and not operating; Measured at DC power supply connector of main unit.)
Insulation resistance: 10 MΩ or higher at 500 V DC (between DC power supply input terminal and case)
Withstand voltage: 500 V AC for 1 minute (between DC power supply input terminal and case)
Accessories: DC power supply connector
Switchover between AC and DC: The DC power supply has priority over the AC power supply.
* The DC power supply cannot be used as a backup in the event of an AC power failure.

### General Specifications

#### Reference operation state
- Ambient temperature: 23±5°C
- Ambient humidity: 55±10% RH

#### Warmup period
At least 30 minutes

#### Storage temperature
- -20 to 60°C

#### Operating humidity
- 30 to 80% RH (no condensation allowed)

#### Life of lithium battery
Approx. 5 years (at ambient temperature of 23°C)

#### Battery backup
Backup for settings and clock

#### Mounting direction
Horizontal

#### Allowable power supply frequency variations
48 to 63 Hz

#### Allowable power supply voltage
- 100 V system: 90 to 132 V AC; Rated power supply voltage: 100 to 120 V AC, 200 to 240 V AC
- 200 V system: 180 to 250 V AC

#### Operating humidity
- 30 to 80% RH (no condensation allowed)

#### Storage humidity
- 20 to 80% RH (Condensation not allowed)

#### Allowable power supply frequency variations
- 48 to 63 Hz

#### Power consumption
- 50 / 60 Hz: Approx. 21.5 kg
- 50 / 60 Hz: Approx. 22.5 kg
- 200 V system: 430 VA max., 250 W max.
- 200 V system: 330 VA max., 200 W max.
- 100 V system: 370 VA max., 250 W max.
- 100 V system: 250 VA max., 200 W max.
- 100 V system: 180 VA max., 150 W max.

### SPECIFICATIONS OF INPUT UNIT

#### AR4400 & AR4800

<table>
<thead>
<tr>
<th>Specification</th>
<th>AR4400 (when 8 input units are installed)</th>
<th>AR4800 (when 16 input units are installed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>When printer is not operating</td>
<td>100 V system 270 V max., 200 W max.</td>
<td>100 V system 170 V max., 250 W max.</td>
</tr>
<tr>
<td> </td>
<td>200 V system 130 V max., 200 W max.</td>
<td>200 V system 430 V max., 250 W max.</td>
</tr>
<tr>
<td>When printer is operating</td>
<td>For DC operation, 150 W max.</td>
<td>For DC operation, 200 W max.</td>
</tr>
<tr>
<td></td>
<td>650 V max., 350 W max.</td>
<td>700 V max., 400 W max.</td>
</tr>
<tr>
<td> </td>
<td>For DC operation, 380 W max.</td>
<td>For DC operation, 350 W max.</td>
</tr>
</tbody>
</table>

#### Withstand voltage
Between power supply and ground: 1500 AC for 1 minute

#### Insulation resistance
Between power supply and ground: 10 MΩ or higher at 500 V DC

#### Mounting direction
Horizontal

#### Battery backup
Backup for settings and clock

#### Life of lithium battery
Approx. 3 years (at ambient temperature of 23°C)

#### Clock accuracy
±100 ppm (typical)

#### Printer
- Recording method: Thermal array printer
- Effective recording width: 201 mm max.
- Recording density: 8 dots/mm

#### External dimensions
Approx. 426 (W) × 221 (H) × 221 (D) mm (When printer cover installed; excluding handle and projections)

#### Weight of main unit (excluding plug-in input units)

<table>
<thead>
<tr>
<th>Model</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>70241</td>
<td>Approx. 15 kg</td>
</tr>
<tr>
<td>70242</td>
<td>Approx. 16 kg</td>
</tr>
<tr>
<td>70241/D1</td>
<td>Approx. 15.5 kg</td>
</tr>
<tr>
<td>70242/D1</td>
<td>Approx. 16.5 kg</td>
</tr>
<tr>
<td>70241/D2</td>
<td>Approx. 21 kg</td>
</tr>
<tr>
<td>70242/D2</td>
<td>Approx. 22 kg</td>
</tr>
<tr>
<td>70241/D1/D2</td>
<td>Approx. 21.5 kg</td>
</tr>
<tr>
<td>70242/D1/D2</td>
<td>Approx. 22.5 kg</td>
</tr>
</tbody>
</table>

#### Standard Accessories
- Chart paper (one 50-roll) AC power cable
- EXT I/O connector Instruction manual
- Chart holder (one) Fuse (5 A)
- SCSI terminator (70241/D1, 70242/D1)
- Rubber pads for rear legs

#### SPECIFICATIONS OF INPUT UNIT

#### (Installed in the 7024□□ Main Unit)

#### 702611 Universal Unit

- Number of input points: 2
- Input type: Floating unbalanced
- Input coupling: DC, AC
- Measurement range:
  - Voltage input 50, 100, 200, 500 mV, 1, 2, 5, 10, 20, 50 V
- Thermocouple input

#### Accuracy (including the reference contact compensation accuracy)

<table>
<thead>
<tr>
<th>Thermocouple Type</th>
<th>Measurement Range</th>
<th>Accuracy (including the reference contact compensation accuracy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>-200 to 1300°C</td>
<td>±0.2% of rdg + 1.5°C</td>
</tr>
<tr>
<td>E</td>
<td>-200 to 800°C</td>
<td>±0.0% of rdg + 1.5°C</td>
</tr>
<tr>
<td>J</td>
<td>-200 to 1100°C</td>
<td>±0.2% of rdg + 1.5°C</td>
</tr>
<tr>
<td>T</td>
<td>-200 to 400°C</td>
<td>±0.0% of rdg + 1.5°C</td>
</tr>
<tr>
<td>L</td>
<td>-200 to 900°C</td>
<td>±0.0% of rdg + 1.5°C</td>
</tr>
<tr>
<td>U</td>
<td>-200 to 400°C</td>
<td>±0.0% of rdg + 1.5°C</td>
</tr>
<tr>
<td>N</td>
<td>0 to 1300°C</td>
<td>±0.0% of rdg + 1.5°C</td>
</tr>
<tr>
<td>R</td>
<td>0 to 1700°C</td>
<td>±0.2% of rdg + 3°C</td>
</tr>
<tr>
<td>S</td>
<td>0 to 1700°C</td>
<td>±0.2% of rdg + 3°C</td>
</tr>
<tr>
<td>B</td>
<td>0 to 1800°C</td>
<td>±0.2% of rdg + 4°C</td>
</tr>
<tr>
<td>W</td>
<td>0 to 2300°C</td>
<td>±0.2% of rdg + 3°C</td>
</tr>
</tbody>
</table>

#### Sampling Rate

<table>
<thead>
<tr>
<th>Sampling Rate</th>
<th>Anti-aliasing Filter</th>
<th>Low Pass Filter</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 kS/s</td>
<td>40 kHz</td>
<td>OFF</td>
</tr>
<tr>
<td>50 kS/s</td>
<td>20 kHz</td>
<td>OFF</td>
</tr>
<tr>
<td>20 kS/s</td>
<td>10 kHz</td>
<td>OFF</td>
</tr>
<tr>
<td>10 kS/s</td>
<td>5 kHz</td>
<td>4 kHz</td>
</tr>
<tr>
<td>5 kS/s</td>
<td>2 kHz</td>
<td>4 kHz</td>
</tr>
<tr>
<td>2 kS/s</td>
<td>1 kS</td>
<td>400 Hz</td>
</tr>
<tr>
<td>1 kS/s</td>
<td>500 S</td>
<td>400 Hz</td>
</tr>
<tr>
<td>500 S/s</td>
<td>200 S</td>
<td>400 Hz</td>
</tr>
<tr>
<td>200 S/s</td>
<td>80 Hz</td>
<td>400 Hz</td>
</tr>
<tr>
<td>100 S/s</td>
<td>40 Hz</td>
<td>400 Hz</td>
</tr>
<tr>
<td>50 S/s</td>
<td>20 Hz</td>
<td>400 Hz</td>
</tr>
<tr>
<td>20 S/s to 5 S/s</td>
<td>20 Hz</td>
<td>400 Hz</td>
</tr>
<tr>
<td>2 S/s to 0.5 S/s</td>
<td>20 Hz</td>
<td>1.5 Hz</td>
</tr>
</tbody>
</table>

**注**
- When the recorder is in the reference operation status or after the warmup period has elapsed
- After automatic calibration
- When the anti-aliasing filter is OFF
702614 Voltage Input Unit (high-speed)

- Number of input points: 2
- Input type: Non-isolated input (unbalanced direct-coupled type)
- Input coupling: DC, AC
- Measurement range: 100, 200, 500 mV, 1, 2, 5, 10, 20, 50 V
- Maximum allowable input range: 30 Vrms or 60 V DC (5 kHz max.)
- Input resistance: Approx. 1 MΩ
- Frequency band: DC to 40 kHz (+1/-3 dB typical, DC-coupled)
- Accuracy (DC): ±0.5% of F.S. (*4 and *5)
- Temperature coefficient (°C): ±0.03% of F.S./°C
- Gain: ±0.02% of F.S./°C
- Low pass filter: 400 Hz, 4 kHz (cutoff frequency, -12 dB/oct), OFF
- When filter setting is AUTO: Low pass filter is automatically selected.
- Filter selection table used when AUTO is set

<table>
<thead>
<tr>
<th>Sampling Rate</th>
<th>Anti-aliassing Filter</th>
<th>Low Pass Filter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 MS/s to 20 kS/s</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>100 kS/s to 200 kS/s</td>
<td>40 kHz</td>
<td>40 kHz</td>
</tr>
<tr>
<td>10 kS/s to 2 kS/s</td>
<td>8 kHz</td>
<td>8 kHz</td>
</tr>
<tr>
<td>1 kS/s to 512 Hz</td>
<td>4 kHz</td>
<td>4 kHz</td>
</tr>
</tbody>
</table>

Maximum allowable in-phase voltage: 30 Vrms or 60 V DC
Allowable signal source resistance: Max. 500 Ω
A/D resolution: 12 bits
Maximum sampling rate: 1 MS/s (for 1-channel operation), 400 kS/s (for 2-channel operation)
Noise: 500 µV-p (typical) (100 mV range input shorted)
Input connector type: BNC
Weight: Approx. 450 g

702615 Voltage Input Unit (isolated, high-speed, 1 CH)

- Number of input points: 1
- Input type: Floating unbalanced (isolated)
- Input coupling: DC, AC
- Measurement range: 100, 200, 500 mV, 1, 2, 5, 10, 20, 50, 100, 200, 500 V
- Maximum allowable input range: 500 V (DC + AC peak) (20 kHz max.)
- Input resistance: Approx. 1 MΩ
- Frequency band: DC to 40 kHz (DC-coupled)
- Accuracy (DC): ±0.5% of F.S. (*4 and *5)
- Temperature coefficient (°C): ±0.03% of F.S./°C
- Gain: ±0.02% of F.S./°C
- Low pass filter: 400 Hz, 4 kHz (cutoff frequency, -12 dB/oct), OFF
- When filter setting is AUTO: Low pass filter and anti-aliassing filter are automatically selected.
- Filter selection table used when AUTO is set

<table>
<thead>
<tr>
<th>Sampling Rate</th>
<th>Anti-aliassing Filter</th>
<th>Low Pass Filter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 MS/s to 20 kS/s</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>100 kS/s to 200 kS/s</td>
<td>40 kHz</td>
<td>40 kHz</td>
</tr>
<tr>
<td>10 kS/s to 2 kS/s</td>
<td>8 kHz</td>
<td>8 kHz</td>
</tr>
<tr>
<td>1 kS/s to 512 Hz</td>
<td>4 kHz</td>
<td>4 kHz</td>
</tr>
</tbody>
</table>

Maximum allowable in-phase voltage: 30 Vrms or 60 V DC (5 kHz max.)
Allowable signal source resistance: Max. 500 Ω
A/D resolution: 12 bits
Maximum sampling rate: 1 MS/s (for 1-channel operation), 400 kS/s (for 2-channel operation)
Noise: 500 µV-p (typical) (100 mV range input shorted)
Input connector type: Safety terminal type (for banana plug)
Weight: Approx. 450 g

Maximum allowable in-phase voltage: 30 Vrms or 60 V DC (5 kHz max.)
Allowable signal source resistance: Max. 500 Ω
A/D resolution: 12 bits
Maximum sampling rate: 1 MS/s
Noise: 600 µV-p (typical) (100 mV range input shorted)
Input connector type: Safety terminal type (for banana plug)
Weight: Approx. 450 g

Maximum allowable in-phase voltage: 30 Vrms or 60 V DC (5 kHz max.)
Allowable signal source resistance: Max. 500 Ω
A/D resolution: 12 bits
Maximum sampling rate: 1 MS/s
Noise: 600 µV-p (typical) (100 mV range input shorted)
Input connector type: Safety terminal type (for banana plug)
Weight: Approx. 450 g
### 702621 Strain Amp Unit

**Number of input points:** 2  
**Circuit type:** DC bridge type (automatic balancing type)  
**Applicable gauge resistance:** ±10000 x 10^−6 strain max. (when gauge resistance is 120 Ω)  
**Input resistance:** 10 MΩ or higher  
**Maximum allowable input range:** ±10 V (DC input)  
**Zero point:** 0.2% of rdg  
**Gain:** 0.2% of rdg  
**Frequency division ratio:** Can be set between 1 and 100 (resolution 1).  
**Response time:** Within 10 μs after one period  
**Threshold level:** ±10 V (DC input)  
**Accuracy:** ±0.5% of F.S. (+0.2% of rdg)  
**Bridge voltage:** 2 V DC (remote sensing)  
**Frequency band:** DC to 20 kHz (+1/−3 dB typical)  
**Measurement range:** 0.1 Hz to 40 kHz (6 rpm to 50 krpm)  
**Maximum number of channels:** 16  
**Maximum memory length per channel:** 1 M data/channel  
**Maximum memory length per channel:** 512 k data  
**Maximum allowable input load:** ±35 V DC  
**Input type:** Balanced differential input, DC amplifier (floating)  
**Maximum allowable input range:** ±1000 ±10 pC/G (when gauge resistance is 120 Ω)  
**Input connector type:** Coaxial (connection screw : #10-32UNF)  
**Weight:** Approx. 450 g  
**Specifications:**  
- Measurement pickup sensitivity: 0.6% of rdg  
- Hysteresis: Approx. 0.2 V  
- Response time: Within 10 μs after one period  
- Threshold level: ±10 V (DC input)  
- Accuracy: ±0.5% of F.S. (+0.2% of rdg)  
- Bridge voltage: 2 V DC (remote sensing)  
- Frequency band: DC to 20 kHz (+1/−3 dB typical)  
- Measurement range: 0.1 Hz to 40 kHz (6 rpm to 50 krpm)  
- Maximum number of channels: 16  
- Maximum memory length per channel: 1 M data/channel  
- Maximum memory length per channel: 512 k data  

### 702622 Logic Input Unit

**Number of input points:** 2  
**Input type:** The same common line in a probe  
**Maximum allowable input range:** ±35 V DC  
**Input impedance:** ±10 kΩ or higher  
**Input type:** Switchable between TTL level and contact input  
**Probe:** 702911 or 702912 (8-ch probe)  
**Weight:** Approx. 450 g  

### 702623 Frequency Input Unit

**Number of input points:** 2  
**Input type:** Floating unbalanced  
**Measurement range:** 0.1 Hz to 40 kHz (6 rpm to 50 krpm)  
**Maximum allowable input frequency:** 1 MHz  
**Accuracy:** ±0.1% of rdg  
**Frequency division ratio:** Can be set between 1 and 100 (resolution 1).  
**Input voltage:** 1 to 30 Vpp  
**Response time:** Within 10 μs after one period  
**Threshold level:** ±10 V (DC input)  
**Accuracy:** ±0.5% of F.S. (+0.2% of rdg)  
**Bridge voltage:** 2 V DC (remote sensing)  
**Frequency band:** DC to 20 kHz (+1/−3 dB typical)  
**Measurement range:** 0.1 Hz to 40 kHz (6 rpm to 50 krpm)  
**Maximum number of channels:** 16  
**Maximum memory length per channel:** 1 M data/channel  
**Maximum memory length per channel:** 512 k data  
**Maximum allowable input load:** 20000 pC  
**A/D resolution:** 14 bits  
**Maximum sampling rate:** 100 kS/s  
**Input connector type:** BNC  
**Maximum sampling rate:** 100 kS/s  
**Input connector type:** BNC  
**Weight:** Approx. 450 g  

### AVAILABLE MODELS

#### Main Unit

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Description</th>
</tr>
</thead>
</table>
| 702411 | -M | Maximum number of channels: 16  
Maximum memory length per channel: 512 k data  
Maximum memory length per channel: 1 M data |
| 702412 | -D | Maximum number of channels: 16  
Maximum memory length per channel: 512 k data  
Maximum memory length per channel: 2 M data |
| 702413 | -F | Maximum number of channels: 16  
Maximum memory length per channel: 4 M data |
| 702421 | -R | Maximum number of channels: 32  
Maximum memory length per channel: 1 M data |
| 702422 | -J | Maximum number of channels: 32  
Maximum memory length per channel: 2 M data |
| 702423 | -M | Maximum number of channels: 32  
Maximum memory length per channel: 4 M data |
| 702424 | -L | Maximum number of channels: 32  
Maximum memory length per channel: 512 k data  
Maximum memory length per channel: 1 M data |

**Power cord:**
- **-M:** UL / CSA standard, with 3-to-2-pin conversion adapter  
- **-D:** UL / CSA standard  
- **-F:** VDE standard  
- **-R:** AS standard  
- **-J:** BS standard  

**Optional specifications:**
- **/D1:** Internal MO disk drive (with SCSI terminator)  
- **/D2:** 12 V DC drive  
- **/D3:** 24 V DC drive  

No selection is possible with only the main unit of AR4400 or AR4800. You will need to purchase an optional input unit or units.

#### Input Unit Model

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
</table>
| 702611 | Universal unit  
702612 | Voltage input unit (without anti-aliasing filter)  
702613 | Voltage input unit (with anti-aliasing filter)  
702614 | Voltage input unit (high-speed)  
702615 | Voltage input unit (isolated, high-speed 1 CH)  
702621 | Strain amp unit  
702622 | Logic input unit  
702623 | Frequency input unit  
702624 | Charge amp unit  

* Other proper nouns such as product names and company names that appear in these specifications are the trademarks or registered trademarks of the respective companies.
### Accessories

(Must be purchased separately.)

<table>
<thead>
<tr>
<th>No.</th>
<th>Product name</th>
<th>Model</th>
<th>Specifications</th>
<th>Q'ty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power unit</td>
<td>365961</td>
<td>Power unit</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Conversion adapter</td>
<td>366921</td>
<td>Conversion adapter (BNC - banana (female))</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Conversion adapter</td>
<td>366922</td>
<td>Conversion adapter (banana (male) - BNC)</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Conversion adapter</td>
<td>366923</td>
<td>Connector adapter (for T-shaped BNC)</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>BNC cable</td>
<td>366924</td>
<td>BNC cable (BNC - BNC 1 m)</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>BNC cable</td>
<td>366925</td>
<td>BNC cable (BNC - BNC 2 m)</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>BNC cable</td>
<td>366926</td>
<td>BNC cable (BNC - BNC 2 m)</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Measurement leads</td>
<td>366963</td>
<td>Measurement leads (for safe terminals)</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Bridge head</td>
<td>319300</td>
<td>Bridge head (for strain amplifier)</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>3.5&quot; floppy disk</td>
<td>705900</td>
<td>2HD</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>3.5&quot; MO disk</td>
<td>366950</td>
<td>230 MB MO disk</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Conversion connector</td>
<td>366971</td>
<td>RS-232-C conversion connector</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Terminator</td>
<td>366972</td>
<td>SCSI terminator</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>Logic probe</td>
<td>702911</td>
<td>8-channel input (including B9879PX and B9879KX)</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>Logic probe</td>
<td>702912</td>
<td>8-channel input (including B9879PX and B9879KX)</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>Connection leads</td>
<td>B9879PX</td>
<td>Alligator clips</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>Connection leads</td>
<td>B9879KX</td>
<td>IC clips</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>Measuring head set</td>
<td>758917</td>
<td>0.75 m long, each supplied in a pair of leads</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>Banana plug set</td>
<td>758919</td>
<td>Adapters with an integral 4-mm wide plug and a 4-mm wide-socket</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>Alligator clip set</td>
<td>758922</td>
<td>Adapters to adapt an alligator clip to a 4-mm wide-socket</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>Safety adapter</td>
<td>758925</td>
<td>Metal-plated conducting stem</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: The logic probe is for the 702622.

### Spares

<table>
<thead>
<tr>
<th>No.</th>
<th>Item name</th>
<th>Part No.</th>
<th>Specifications</th>
<th>Order Q'ty</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Roll recording paper</td>
<td>B9879AJ</td>
<td>50 m (1 roll/unit)</td>
<td>10</td>
</tr>
</tbody>
</table>

### DIMENSIONS

* The external dimensions of both the AR4400 and AR4800 are the same.

#### Standard Model

<table>
<thead>
<tr>
<th>Unit : mm (inch)</th>
</tr>
</thead>
</table>

#### DC Drive Model

<table>
<thead>
<tr>
<th>Unit : mm (inch)</th>
</tr>
</thead>
</table>