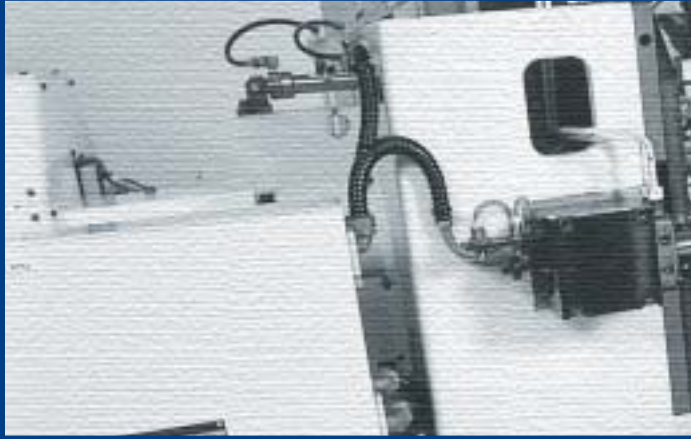


ONO SOKKI



A new concept in analyzers



Multichannel
Data Station

DS-2000 Series



Stylish and speedy - a new form of measurement and analysis. The DS-2000 Series is born.

The DS-2000 was created to realize maximum performance in terms of mobility and precision, in order to provide the most accurate possible analysis. The combination of the 18 cm x 25 cm (7" x 10") basic unit with a portable PC enables quick and accurate analysis of sound and vibration data in any work field. The unit has a dynamic range of over 100 dB and provides the highest accuracy in its class through 24-bit A/D conversion. The Throughput Disk function of the unit allows sampled waveforms to be recorded directly onto the hard disk of your portable PC, enabling them to be analyzed off-line on the PC later. Moreover, a wide variety of applications are available for use with the unit, including those for FFT analysis, tracking analysis, real-time octave analysis, and more.

Thus, this analyzer can satisfy all customer needs in a wide range of specialized fields.



We are surrounded by a diverse array of noise and vibration. The DS-2000 Series was created to provide a comfortable environment by reducing the levels of such pollutants.

- The unit comes in a compact body measuring 18 cm × 25 cm and weighing 2.3 kg.



- A dynamic range of over 100 dB has been achieved through 24-bit A/D conversion.

- Designed to be noise-free, with no need for a cooling fan



- Equipped standard with a remote-control function



- Provides the Throughput Disk function to enable offline analyses using a PC alone

- The File Export function allows files to be converted to WAV and other formats.

- Accepts direct input from a variety of sensors



- Supports four types of power supplies: AC power, DC power, internal battery and external battery

※A 24-V DC power supply and battery power supplies are available as optional equipment.

Directly records measurement data on the hard disk of a portable PC

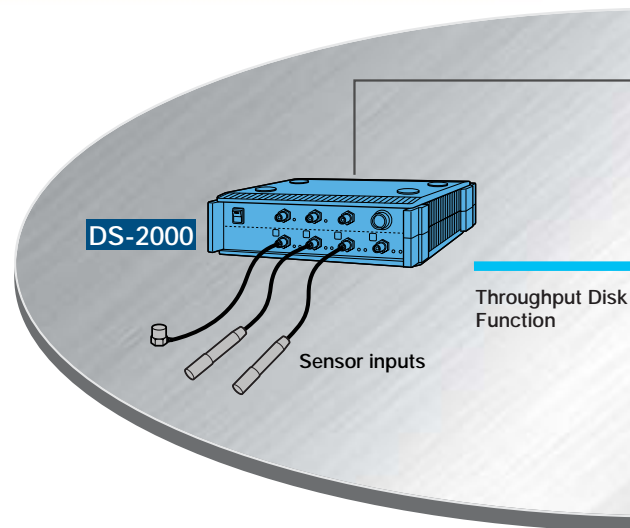
...Throughput Disk Function

Field



Application area in the field

The 2-channel and 4-channel basic units of the DS-2000 Series are compact in size at 18 cm × 25 cm (7" × 10"), and they weigh less than 2.3 kg (5.1 lb) each. Due to its dedicated carrying case that also accommodates a notebook-type PC and sensors, each unit can readily be mobilized anywhere. The unit operates on any of four different power supplies, including an external battery. In addition, its ability to accept direct signal input from various types of sensors allows the unit to be used flexibly and effectively in a wide range of measurement fields. Furthermore, the Throughput Disk function enables the user to record sound and vibration data continuously onto the hard disk of a notebook-type PC, thereby eliminating the need to repeat data recording for each application. After measurements are taken, it is only necessary for the user to bring the PC back to the office, where the data can be analyzed thoroughly at your leisure.



Throughput Disk Function

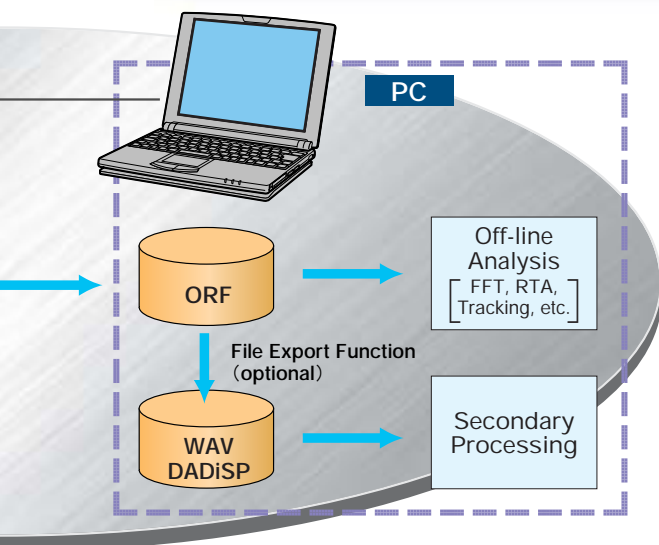
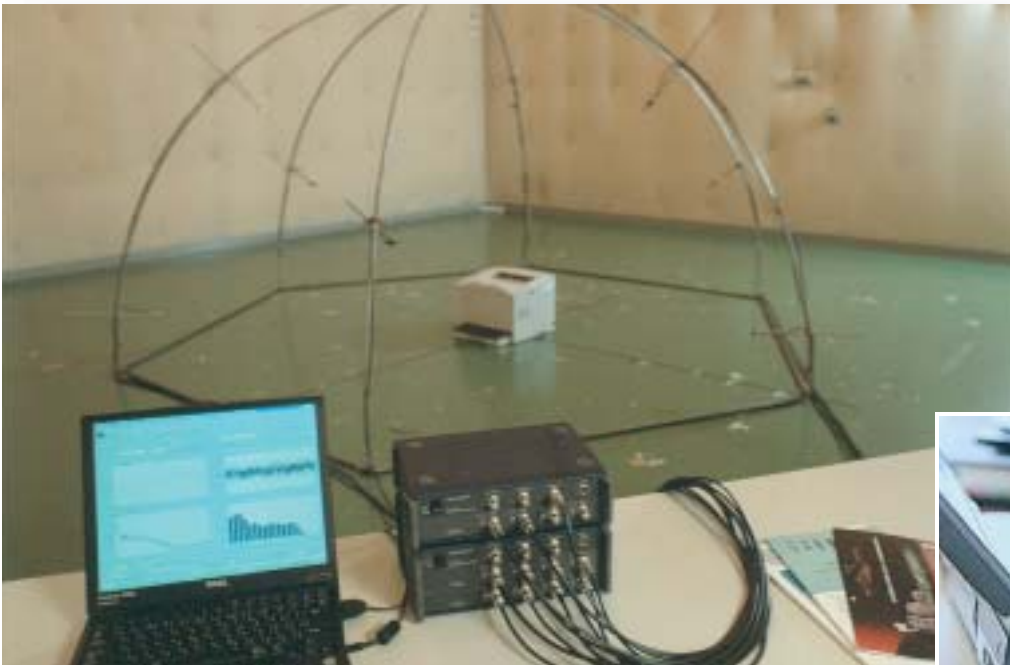
Raw waveforms can be recorded directly onto the hard disk of a portable PC. This eliminates the need to repeat data storage or acquisition on a data recorder, and enables digital data to be stored free from deterioration for an extended period.

■ Max. Recording Time (min.)		※When recorded with 16-bit A/D conversion		
f range	ch	2	4	8
40kHz		57min.	43min.	—
20kHz		115min.	86min.	57min.

Data analysis using only a PC, as well as other secondary processing, can also be performed.

...Off-line Analyses

Lab



Application area in the lab

The number of channels of the DS-2000 Series can be increased as necessary from a minimum of 2 to a maximum of 32. This feature can be put to optimum use when the unit is used to conduct measurements at laboratories and research institutes at which many data inputs are required, such as sound power level measurement in an anechoic chamber, vibration analysis of large structures, and the like. In addition, the DS-2000 Series is designed to be noise-free, as it requires no cooling fan. Therefore, when it is necessary for a very weak sound to be measured in an anechoic chamber, the unit provides high-precision analysis over a dynamic range of more than 100 dB, as it produces no noise. Furthermore, for measurement results, the user can choose the data file format best suited to the secondary-processing software to be employed.

Off-line Analysis

Data recorded using the Throughput Disk function can be analyzed on a PC alone, independently of the measurement unit. In addition, you can process other applications, even while performing an analysis.

File Export Function

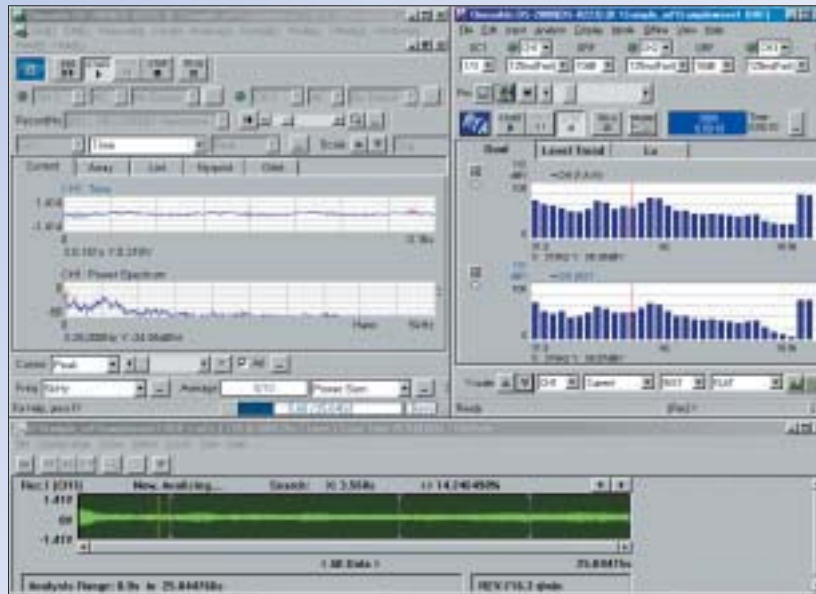
Data recorded using the Throughput Disk function in the ORF file format can be converted to other file formats, including WAV and DADiSP, for secondary processing using other application software.

Software

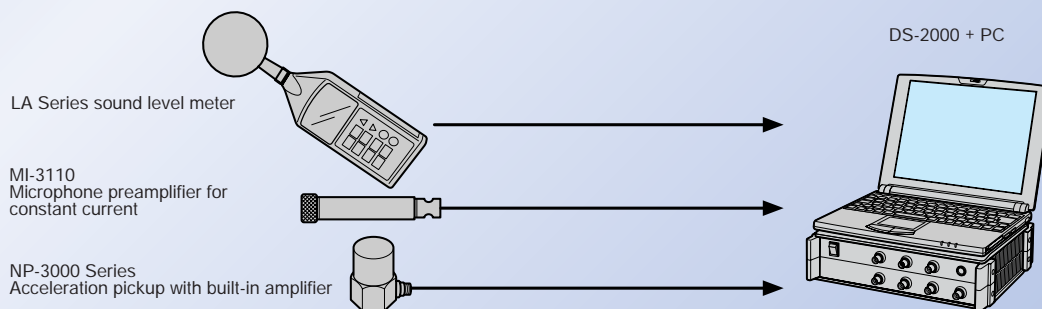
High-Order Measurements and Analyses

FFT Analysis/ Real-Time Octave Analysis

[Example of Simultaneous FFT/Real-Time Octave Analyses Performed Offline]



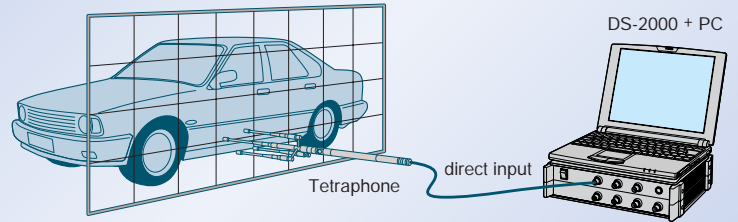
For the FFT analysis, the unit is capable of simultaneously processing signals of a minimum of 2 and a maximum of 32 channels, to perform frequency analysis over a range of a maximum of 40 kHz and with 6400-line resolution. As with the Real-Time Octave analysis, the unit can simultaneously analyze data from 2 to 32 channels. Moreover, when an ORF file created using the Throughput Disk function is analyzed offline, FFT analysis and Real-Time Octave analysis can be performed simultaneously on the same file.



Implemented through the Use of Diverse Applications

Sound Intensity

The DS-2000 Series accepts direct input from a microphone probe for sound intensity measurements (single-axis or three dimensional type). When sound intensity is measured using a three-dimensional probe, map analyses such as real-time sound-source explorations, 3D color mapping, contour representations, three-dimensional vector representations, and the like can be conducted.



[Contour Representation]



[Vector Representation]

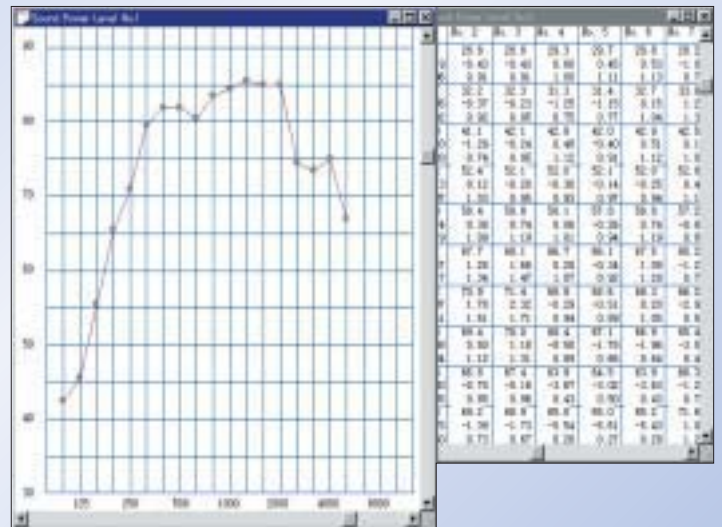
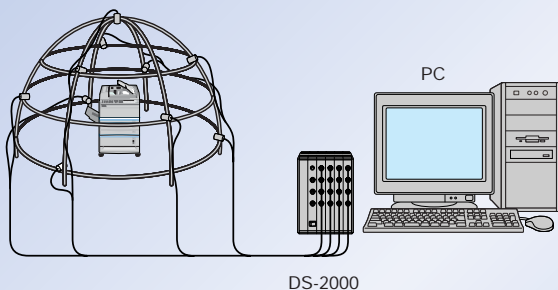


Sound Power Level

The unit enables Sound-Pressure-Method Sound Power Level measurements conforming to ISO3741-3748, 7779*, and JIS Z8732-8734.

※option

[Sound-Pressure Method]

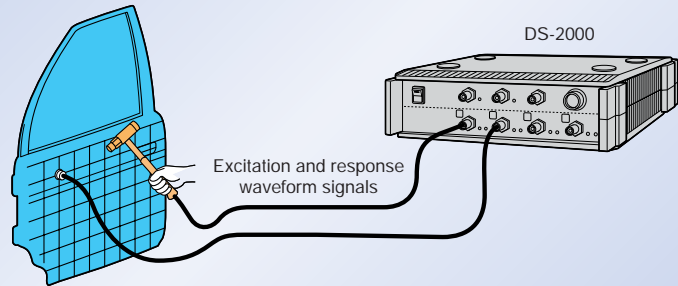


Software

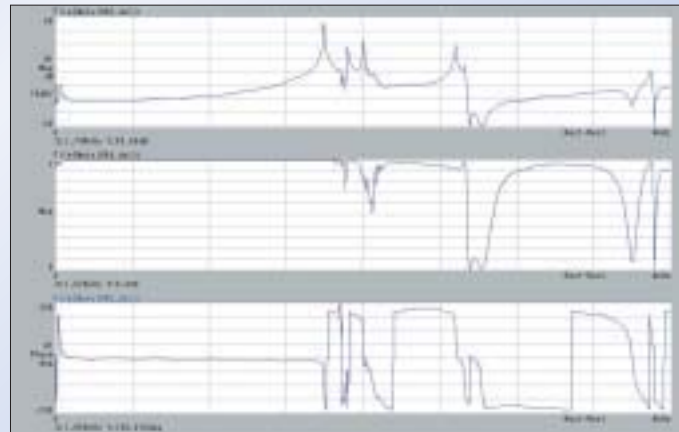
Frequency Response Function

The unit can be used to perform high-precision analyses of frequency-response functions over a dynamic range of more than 100 dB with 24-bit A/D conversion. The unit can be expanded from a minimum of 2 to a maximum of 32 channels. This feature is particularly useful for measurements that require many data inputs, such as for vibration-mode analyses of large structures and the like.

Moreover, measurement of frequency-response functions can be conducted through simultaneous multi-point excitation using two signal outputs.

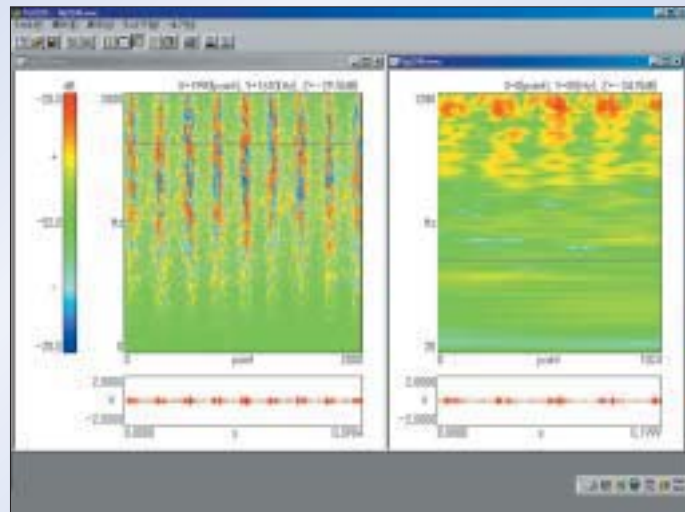


[Frequency Response Functions]



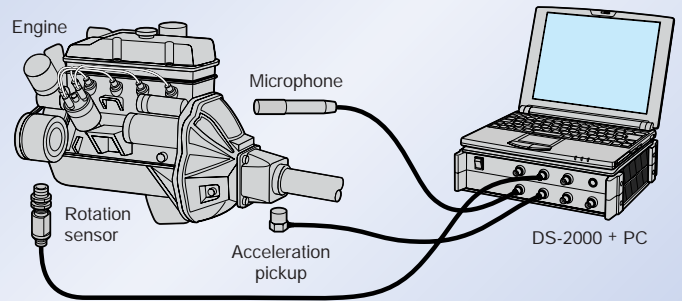
Time-Frequency Analysis

The software performs various types of operational processing, such as short-time FFT, wavelet conversion, and Wigner distribution analysis, on a time-based waveform data file recorded through the DS-2000. These analyses provide an effective means of analyzing non-continuous signals on the time and frequency axes.



Tracking Analysis

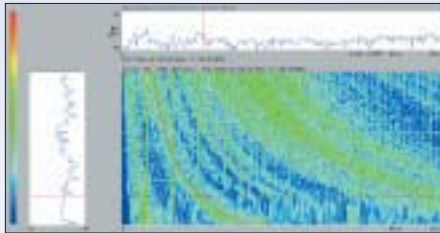
The unit provides the various functions required to perform tracking analyses, including constant-ratio, constant-bandwidth, time tracking, phase tracking, the tracking-file averaging function, and others. Data recorded using the Throughput Disk function can also be subjected to an offline tracking analysis or real-time octave-band tracking analysis.



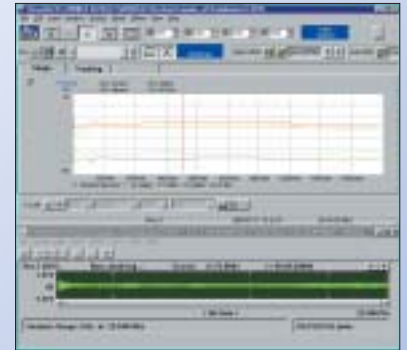
[Tracking Chart in Offline Analysis]



[Sample Output of the Color Spectrograph]



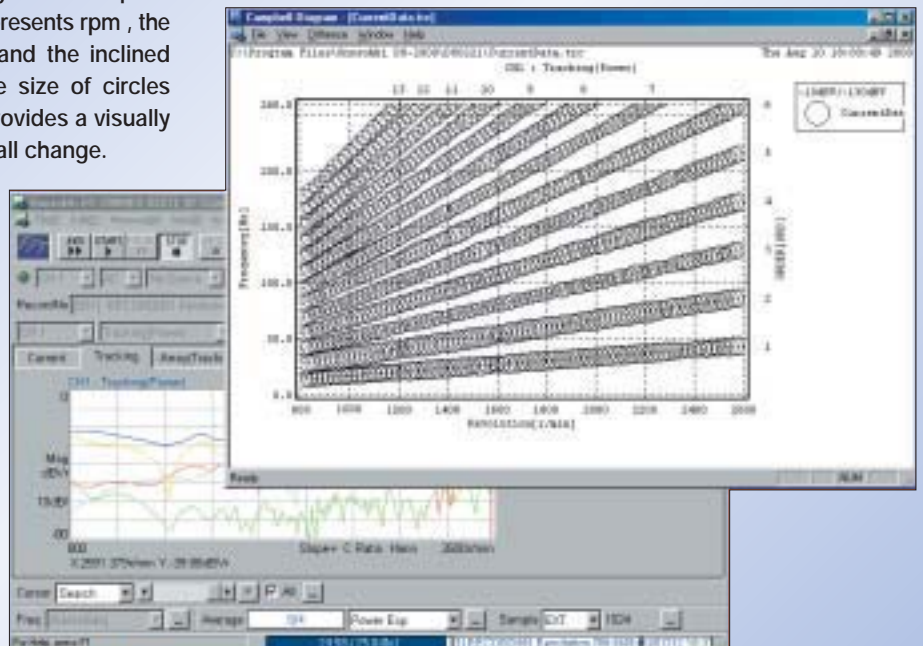
[Real-Time Octave-Band Tracking Analysis]



(Optional function of real-time octave analysis)

Campbell Plot

Tracking analysis data can be displayed as Campbell plot. In this plot the horizontal axis represents rpm, the vertical axis represents frequency, and the inclined axis represents rpm order, with the size of circles representing amplitudes. This plot provides a visually understandable presentation of overall change.

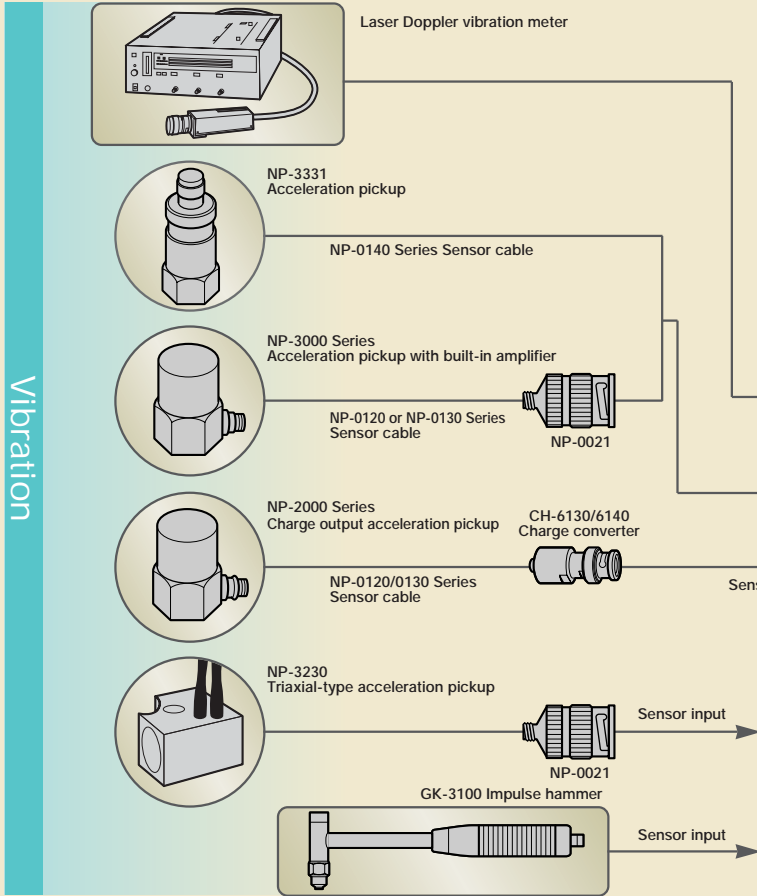


Hardware

Measurements and Analyses Supported by

System Configuration

Detectors



The DS-2000 Series measurement and analysis system can be expanded to a maximum of 32 channels through the combination of 2-channel or 4-channel units.



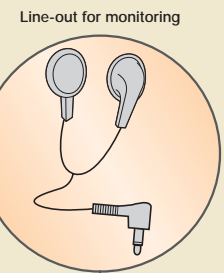
2-channel basic unit



4-channel basic unit

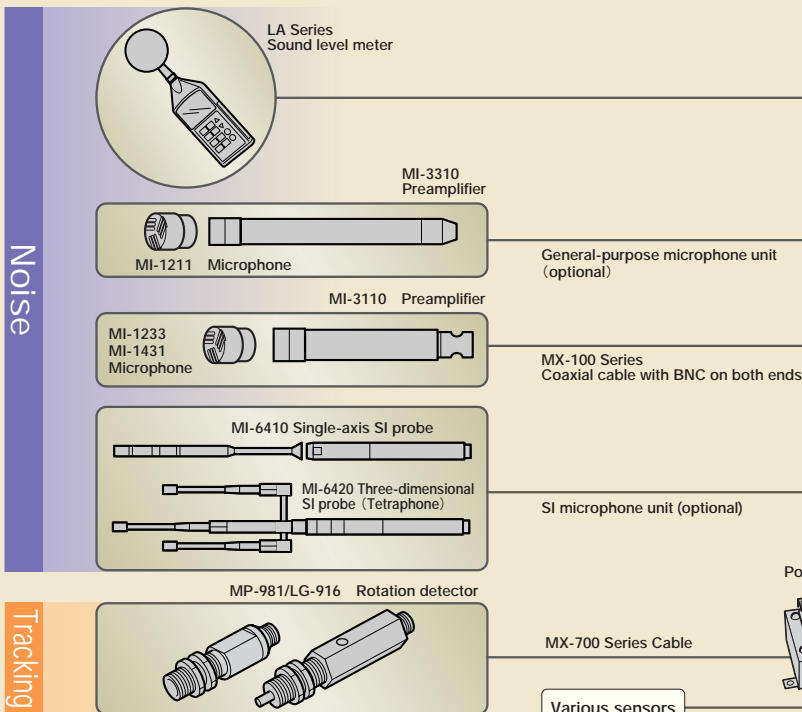


Sample configuration of 32 channels



Line-out for monitoring

[DS-2000]



the Wide Variety of Available System Configurations

■ Software

DS-0221	General-purpose FFT analysis
DS-0222	Tracking analysis
DS-0223	Real-time 1/1 & 1/3 octave analysis
DS-0224	Real-time 1/N octave analysis
DS-0225	Three-dimensional sound-intensity analysis
DS-0226	Sound-intensity analysis
DS-0230	Time-frequency analysis
DS-0231	Sound power measurement (Sound-pressure method)
DS-0243	Octave tracking analysis
DS-0244	Campbell plot function
DS-0250	Throughput disk function
DS-0251	File export function

■ Hardware

DS-2100	Main unit
DS-2102	2-channel basic unit (2-channel basic set)
DS-2104	4-channel basic unit (4-channel basic set)
DS-0262	2-channel general-purpose input unit (for expansion)
DS-0264	4-channel general-purpose input unit (for expansion)
DS-0271	1-channel signal output module (to be contained in the main unit)
DS-0272	2-channel signal output unit
DS-0285	Sound-intensity microphone input unit
DS-0286	2-channel general-purpose microphone input unit (for 2-channel bias-type microphones)
DS-0287	4-channel general-purpose microphone input unit (for 4-channel bias-type microphones)
DS-0290	AC power-supply unit (Required for a configuration of 10 channels or more)
DS-0291	DC power-supply unit (Required if 24-V DC power is supplied)
DS-0292	Internal battery unit (8-channel or less)
DS-0296	ONO-LINK II (Interface for PC with PCI Bus)
DS-0297	ONO-LINK II (card) (Interface for PC with PCMCIA Card Bus)



CD-ROM/Protection key

■ Sample System Configurations

2-Channel FFT Set	4-Channel FFT Set	4-channel FFT + Tracking + Throughput	8-channel FFT + Tracking + Throughput	4-channel FFT + Real-Time Octave Analysis	3-Dimensional Sound Intensity	10-Channel Sound Power Level
DS-2102 DS-0296 (or DS-0297) DS-0221V	DS-2104 DS-0296 (or DS-0297) DS-0221W	DS-2104 DS-0296 (or DS-0297) DS-0221W DS-0222W DS-0250W	DS-2104 DS-0264 DS-0296 (or DS-0297) DS-0221W DS-0222W DS-0250W	DS-2104 DS-0296 (or DS-0297) DS-0221W DS-0223W	DS-2100 DS-0285 DS-0271 DS-0296 (or DS-0297) DS-0225 MI-6420 MI-0620	DS-2102 DS-0264 x 2 DS-0271 DS-0296 (or DS-0297) DS-0231 DS-0290

V : Software for two channels
W : Software for four or eight channels
X : Software for ten channels or more

■ Dedicated Carrying Cases (Optional)



CC-0025 Soft case



CC-0026 Hard case

Dedicated cases that snugly accommodate a notebook-type PC and the DS-2000 Series 2ch - 8ch units

■ Peripherals



DS-0295 Remote-control unit / cable (supplied with DS-2100 main unit)



DS-0297 Interface card / cable for PCMCIA (Card Bus)



DS-0296 Interface card / cable for PCI



DS-0001 Vertical installation stand for 2ch - 8ch units

Specifications of Multichannel Data Station DS-2000 Series

DS-2102/2104 2-Channel/4-Channel Units Basic Sets

The main unit computes digital signals received from the combined input unit and pulse signals transmitted at high speed by the DSP, transfers the data to a PC, and performs other interfacing functions.

1. Performance and Functions

Computing function	FFT operation, real-time octave rms operation, clock control (tracking, etc.), analog control, interfacing with PC
Frequency ranges	2 - 16ch: 4mHz-40kHz (58 ranges) 17 - 32ch: 4mHz-20kHz (58 ranges)
FFT real-time rate	40kHz/4ch, 20kHz/8ch, 10kHz/16ch (2048 points, internally sampled)
Record memory	Fixed at 128 MB (The capacity per channel varies in inverse proportion to the number of channels in use.)
Recording time	5min. 27sec. (for 8 channels in 5-kHz range)
Number of input channels	2 - 32 channels (in 2-channel steps)
Max. number of units	Up to 8 input units, up to 2 power units
Ext. sample input Record memory	1ch, ± 0.5 to $\pm 10V$, AC/DC coupling, input frequency range: 0Hz to 85kHz $\pm 10\%$ (-3dB, with bandpass filter), number of input pulses/rotation: 0.5 to 1024
Ext. trigger input	1ch, ± 0.5 to $\pm 10V$, AC/DC coupling
PC interface	Interfaced with a PC-AT-compatible computer through ONO-LINK II /PCI or ONO-LINK II(CARD) /PCMCIA (Card Bus)
Remote control	Standard supply (Operational functions can be assigned to 5 keys.)

2. General Specifications

External Dimensions	257mm (W) \times 74 to 344mm (H) \times 182mm (D)
Weight	From not more than 2.3 kg (with 4 channels) to 11kg (with 32 channels)
Supply voltage	Rating: 12 V DC (9 to 16.5 V)
Power consumption	15VA (with 4 channels) to 80VA (with 32 channels)
Operating temperature range	0°C to 40°C (Storage: -10°C to 60°C)
CE marking	Compliant
Cooling fan	Not provided

DS-0262/0264 General-Purpose Input Unit

When the general-purpose input units for frequency analysis are combined with the DS-2100 main unit, a multichannel configuration can be created. The digital filter incorporated into these input units enables the performance of various types of filter operations.

Number of channels	2 (DS-0262), 4 (DS-0264)
Input connector	BNC
Input format	Single-ended
Input impedance	1 M Ω , 100 pF or less
Input coupling	DC or AC (-3dB at 0.55Hz \pm 5%)
Sensor current	2mA or 4mA
Analog filter	A-, B-, C-weighting
Input voltage range	-40 to +20dB Vrms, in 10-dB steps
Absolute max. input voltage	70Vrms, AC, 1min. (50Hz)

Input-level monitor	The red LED lights up to indicate an excessive input (90% of the full-scale range).
Frequency range	0Hz to 40kHz
Sampling rate	32kHz, 44.1kHz, 48kHz, 51.2kHz, 64kHz, 96kHz, 102.4kHz, etc
A/D converter	24 bits, delta-sigma type
Dynamic range	100dB or more
Inter-channel crosstalk	-100dB (1kHz) or less
Inter-channel gain accuracy	Within ± 0.3 dB
Inter-channel phase accuracy	Within ± 0.5 degree (DC-20kHz), ± 1.0 degree (20 - 40kHz)
Digital filter	Anti-aliasing filter

DS-0271/0272 Signal Outputs

The DS-0271 is of the module type to be built into the DS-2100 main unit, while the DS-0272 is of the unit type. These units are capable of transmitting sine, swept sine, pseudo-random, random, impulse signals, and octave band noise.

Number of channels	1 (DS-0271), 2 (DS-0272; two such units can provide 4 channels)
Output impedance	50 Ω \pm 10%
D/A converter	20 bits, delta-sigma type
Converting rate	32kHz, 44.1kHz, 48kHz, 51.2kHz
Frequency range	0Hz - 20kHz
Output-voltage amplitude	± 10 mV to ± 2 V

Type of signal	Sine waves, swept sine, random, pseudo-random, impulse, octave band noise, pink noise, analogue output of time record data
Applicable FFT analysis length	64/128/256/512/1024/2048/4096
Output mode	Continuous/single burst/continuous burst
Voltage amplitude accuracy	Within ± 0.5 dB
Octave-band noise	15 bands of 1/1oct (1Hz to 16kHz) 47 bands of 1/3oct (0.5Hz to 20kHz)

Operating Environment^{※1}

Operating system(OS): Windows98, Me, 2000, NT4.0(SP5)^{※2} or XP

Connection to desktop PC: PCI BUS

Connection to notebook-type PC: PCMCIA (CardBus)

※1 The PC operating environment may be subject to certain constraints, depending on the type of application software used.

※2 Desktop PC only

●Windows is a registered trademark of Microsoft Corporation in the United States and other countries. The other trade names and product names included herein are also registered trademarks.

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