CE

DS-3000 Series

Sound and Vibration Real-time Analysis System

Supports USB 3.0

POWER
SYSTEM
USB
GREEN :3.0
ORANGE :2.0
REMOTE
EXT TRIG IN
EXT SAMP IN
1
SIGNAL OUT

DS-3200 Multi-Channel Data Station

1 INPUT   2 INPUT   3 INPUT   4 INPUT

DS-0364 4ch Input Unit

Software
Hardware
Multi-Channel Data Station
DS Series

ONO SOKKI

The DS-3000 Series can perform real-time analysis of noise and vibration generated
from products in various industries such as vehicles, railways, home appliances or plant facilities.
"Quick reference of the required analysis screen" "easy checking of the measurement condition",
such quick and easy responses are one of the most important needs for on-site measurement.
The hardware at overwhelming processing speed and
easy handling software of the DS-3000 Series exactly satisfy the needs.

DS-3000 Series

Speedy	Tough	Small size	+	Easy-to-use
HARDWARE				SOFTWARE

There is increasing interest in sound and vibration analysis to create added value to products.

- Controlling vibration
- Low-noise measure
- Acoustic comfort design

Data recording

Ch1 — time → Ch2 — time → Ch3 — time → Ch4 — time

The DS-3000 Series can perform multi-channel data recording of various sound or vibration.
Accurate and wide range of simultaneous multi-channel data recording is allowed owing to the wide dynamic range and high-speed processing.

FFT Analysis (Fast Fourier Transform Analysis)
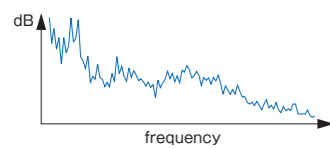
dB / frequency

FFT analysis takes apart the time waveform to each frequency component and is useful for watching the level of the each component. This analysis is effective to watch resonance frequency of vibration or details of sound frequency component.
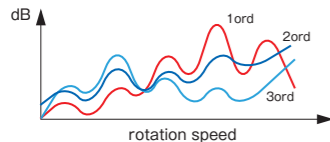
Vibration analysis of home appliances, working sound analysis produced by OA equipment

Real-time Octave Analysis
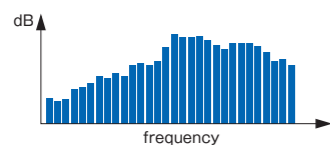
dB / frequency

"Octave" represents the 1:2 ratio of frequency, that is, a frequency band where the highest frequency is twice the lowest frequency. The result of octave analysis is close to human hearing sense because human ears have logarithmic feature. Generally the 1/3 octave analysis (one-third of an octave) is used in the sound analysis.

Sound level measurement of factories, road traffic noise

Rotation Tracking Analysis

dB / rotation speed
1ord, 2ord, 3ord

In sound or vibration analysis from various rotating objects, it is necessary to know which number of rotations makes the noise louder. Then level of each order component for the rotation can be analyzed by recording rotation information (pulse vibration etc.) as well as the sound or vibration signals.

Analysis of abnormal noise from gears, vibration analysis of running vehicles
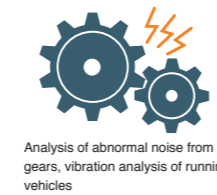
Feature. 1 Speedy

Fast real-time processing & multi-channel recording with USB 3.0

- Commercially available USB cable can be used when connecting to a PC.
- Both USB 3.0 and USB 2.0 are available.
- The type of USB connected is easily checked, which is automatically indicated on the front panel.

Front panel
LED color tells the type of the connecting USB.

USB
GREEN : 3.0
ORANGE : 2.0

Rear panel
USB

Feature. 2 Easy

Software design placed a high value on on-site measurement

- All the installed analysis functions can be used quickly by activating the software.
- Measurement conditions can be easily changed during watching the measurement screen in real time.
- To support speedy and smooth measurement on site, commonly-used setup items can be placed as tabs on the window.
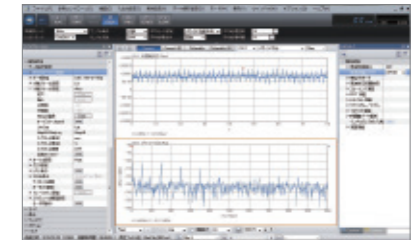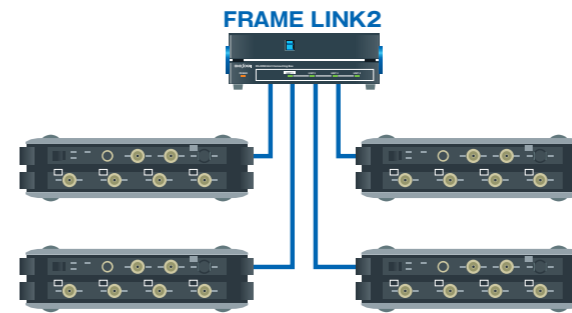
Feature. 3 Flexible

Unit connection function "FRAME LINK2"

FRAME LINK2 can temporarily build up a multi-channel measurement system by connecting units of the DS-3000 series with exclusive cables and box. Up to four units (128 channels) can be connected.
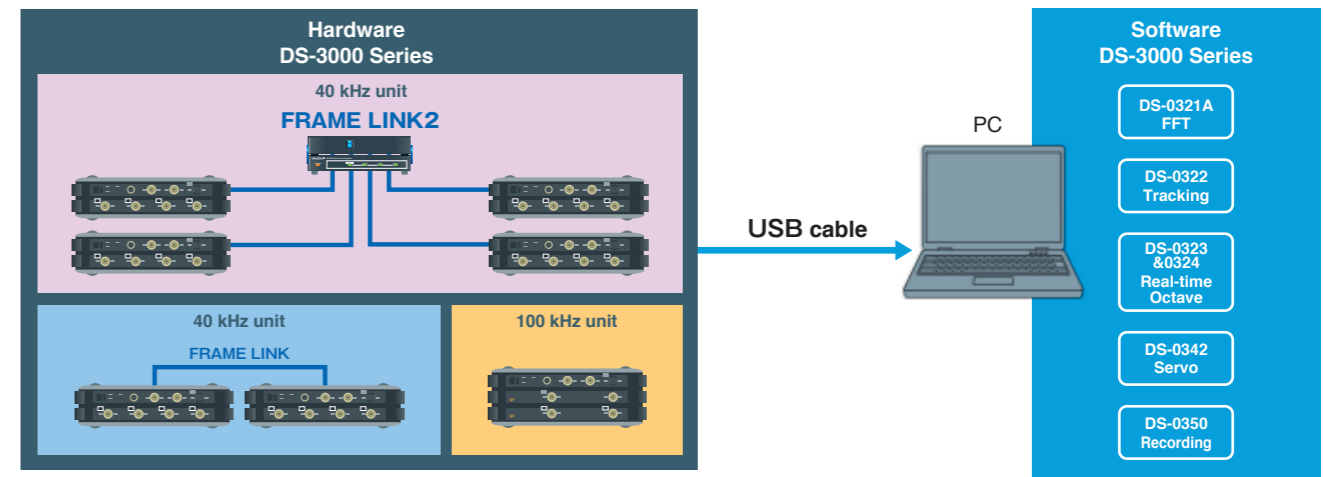
FRAME LINK2

Feature. 4 Reliable

Simultaneous processing of real-time analysis and recording

This function enables recording of backup data automatically while performing real-time analysis.

FFT | AVG | START | PAUSE | STOP | REC

*FFT analysis:
DS-0321A and DS-0350 are required.
*Octave analysis:
DS-0323 and DS-0350 are required.
*Tracking analysis (constant width):
DS-0321A, DS-0322, and DS-0350 are required.

DS-0321A: FFT Analysis
DS-0322 : Tracking Analysis
DS-0323 : 1/1 and 1/3 Real-time Octave Analysis
DS-0350 : Recording Function

DS-3000 Series Sound and Vibration Real-time Analysis System

Hardware
DS-3000 Series

40 kHz unit
FRAME LINK2

40 kHz unit
FRAME LINK

100 kHz unit

USB cable

PC

Software
DS-3000 Series

- DS-0321A FFT
- DS-0322 Tracking
- DS-0323 &0324 Real-time Octave
- DS-0342 Servo
- DS-0350 Recording

## Making best suited setup for on-site measurement

During the measurement, it is necessary to alter the measuring conditions at the site accordingly to unexpected situations including occurrence of noise (environmental noise, disturbance vibration from other equipment) or change of test items. Also according to the various measurement contents such as noise and vibration, making appropriate measurement setting is required. The DS-3000 series can respond flexibly and quickly to such situations, and find the best-suited setup for accurate measurements.
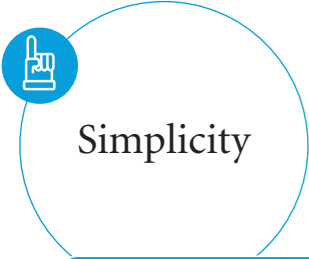
Simplicity

Graph layout selection button
•Easy to set the number of graph screens (M × N) with a mouse.
•Up to 128 screens can be displayed in one window.
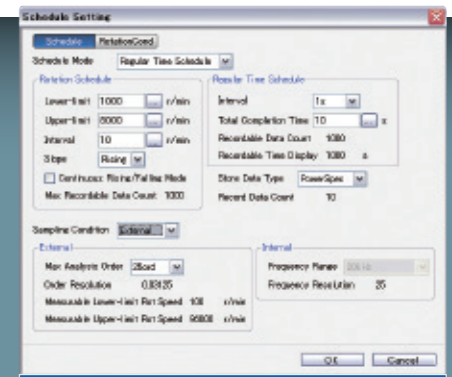•Up to 10 windows can be displayed.
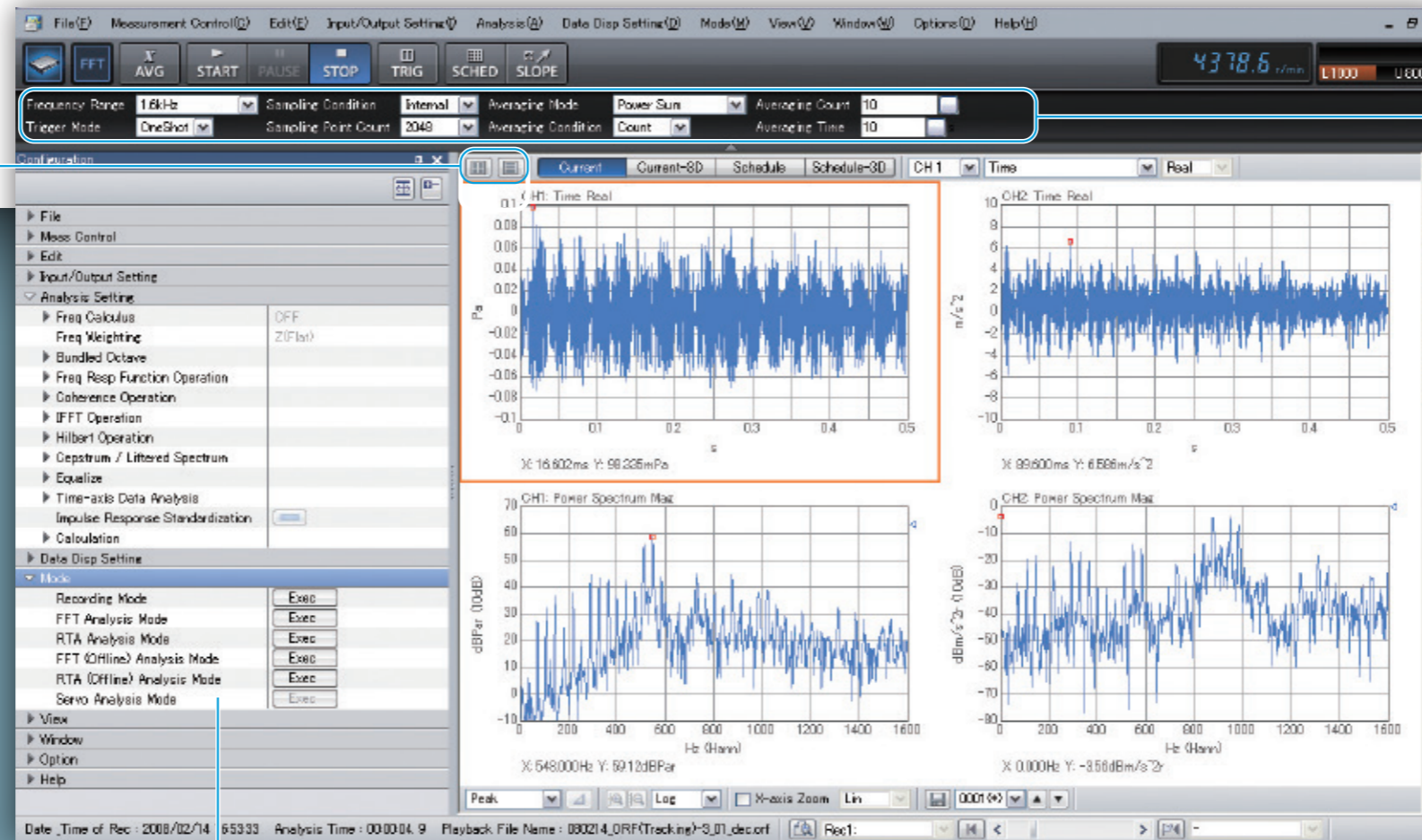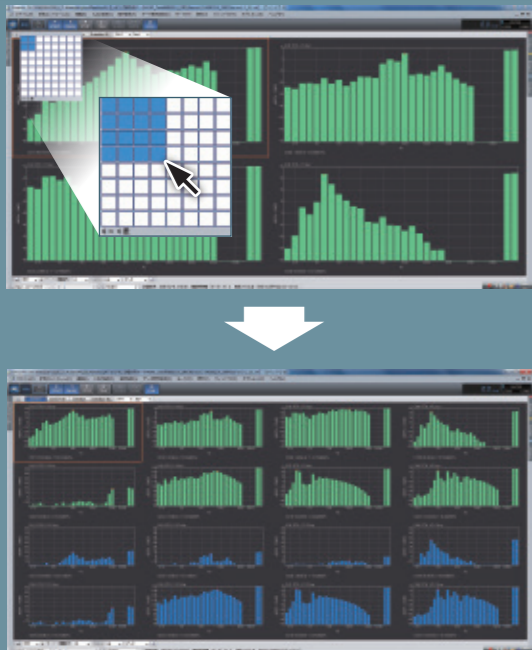
Option bar
•Frequently-used setup items are allocated.
•Enables you to change the setting values directly.
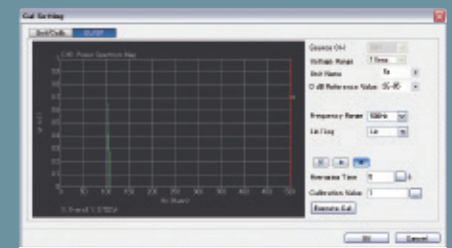•Can be displayed or undisplayed with the button under the bar.

Setup dialogue box
•The settings required for tracking analysis can be listed and set in the dialog box.
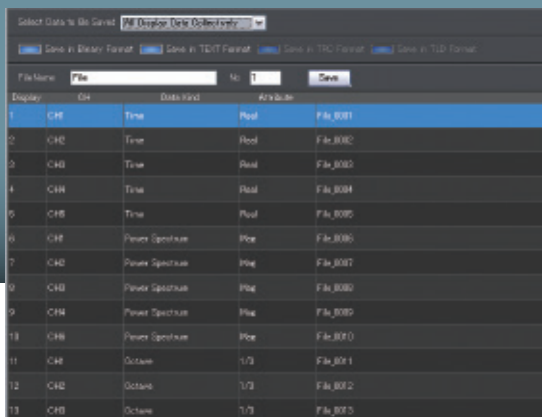
Scheduled measurement setting

•The settings required for a sensor calibration using a calibrator can be listed and set in the dialog box.

Calibration setting

Main window

Data saving window
•Displays the data in a list format and saves them all at once.
•Up to 3200 data can be saved at a time.
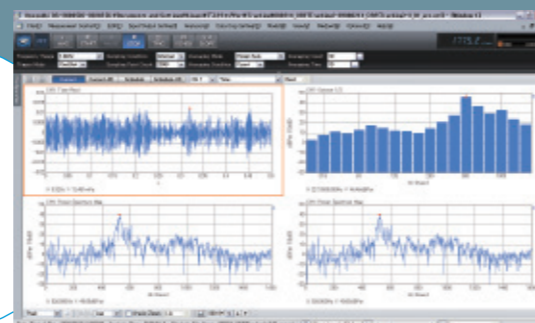•Set contents saved can be output as files.

Configuration window
•Setup items are displayed in a tree structure.
•Setup conditions can be changed while checking the graph under measurement in real time.
•The graph area can be made wider by hiding the window.

Visibility

Example when the configuration window is not displayed
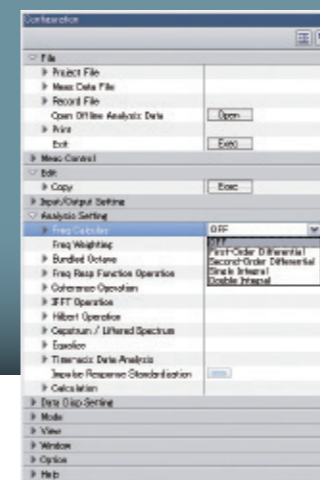
Frequency calculus setting

Custom window
•Commonly-used measurement setup items can be placed as tabs on the window selected from the configuration window. It enables quick checking or changing of measurement conditions.
•Up to 3 windows can be made depending on the measurement object or user.

Convenience

Functions contribute to easier operation

Function ❶ Unit connection function

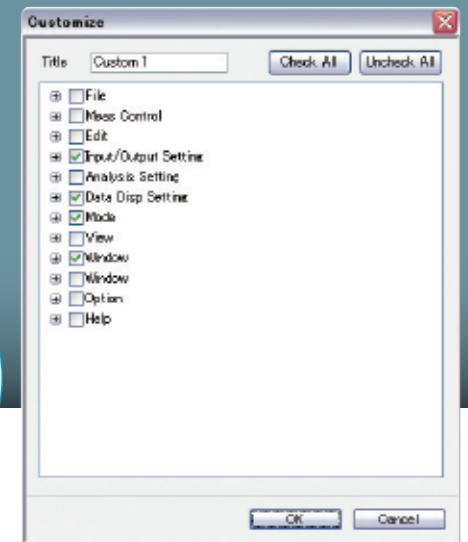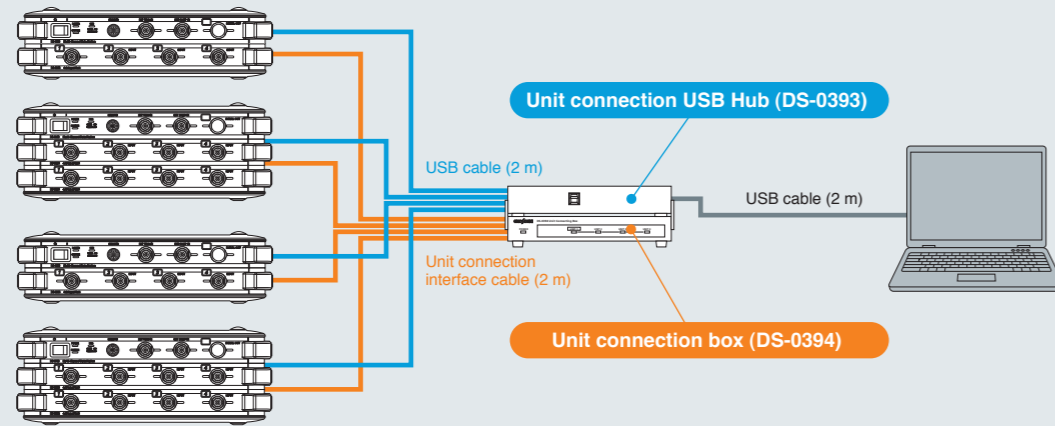With the Unit connection function, you can temporarily build multi-channel measurement system by connecting multiple DS-3000 series units that you already have. Effective when you want to increase measurement channels. It can support multi-channel measurement while effectively utilizing existing facilities.

"FRAME LINK2"

Provides flexible building of multi-channel measurement system only by connecting units of the DS-3000 series via cables and Unit connection box (DS-0394), unit connection USB Hub (DS-0393). Up to 4 units of the DS-3000 series are able to be connected (max. 128-ch). The function has been greatly improved compared with FRAME LINK (existing model).

Upper unit:
Unit connection USB HUB (DS-0393)
Lower unit:
Unit connection box (DS-0394)

Connection example

Unit connection USB Hub (DS-0393)
USB cable (2 m)
USB cable (2 m)
Unit connection interface cable (2 m)
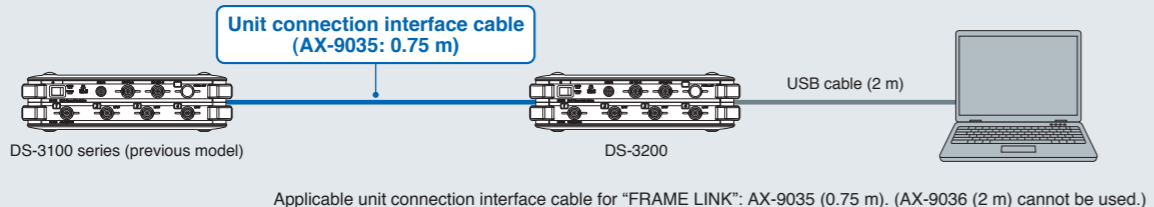Unit connection box (DS-0394)

● **List required for connection**
Unit connection interface cable : AX-9035/AX-9036
Unit connection box : DS-0394
USB cable : AX-9041
Unit connection USB hub : DS-0393

"FRAME LINK"

Connects two units of the DS-3000 series with an exclusive cable. Not only connecting two DS-3200 series each other, but also connecting the DS-3200 series and the DS-3100 series (previous model). *Maximum number of channels: 64

Unit connection interface cable (AX-9035: 0.75 m)
USB cable (2 m)
DS-3100 series (previous model)
DS-3200

Applicable unit connection interface cable for "FRAME LINK": AX-9035 (0.75 m). (AX-9036 (2 m) cannot be used.)

Notes for unit connection function

(FRAME LINK2)
• Only the DS-3200 (current model) is supported. DS-3100 (previous model) is not supported.
• Unit connection box (DS-0394) is always required.
• Unit connection interface (DS-0392A) has to be installed to the DS-3200 (main unit).
• The commercially available USB HUB cannot be used. Make sure to use the unit connection USB HUB (DS-0393).
• DS-0321A (FFT Analysis Function) software license is required. It does not operate only with the DS-0321.
• It operates in FFT-A mode. (It does not operate with other than the FFT-A mode).
• It is also possible to directly connect multiple units and PC with USB cables without using the unit connection USB HUB (DS-0393).
• Interface cables with different lengths cannot be used together.

(FRAME LINK)
• Applicable unit connection interface cable: AX-9035 (0.75 m) (AX-9036 (2 m) cannot be used.)
• Unit connection interface is required. DS-0392 or DS-0392A is required for the DS-3200 (main unit). DS-0391 is required for the DS-3100.

## Function ❷ Auto measurement function

This function enables users to start measurement, record data, and stop measurement automatically. With this function, repeated measurements can be automatically performed, thus saving time and effort.
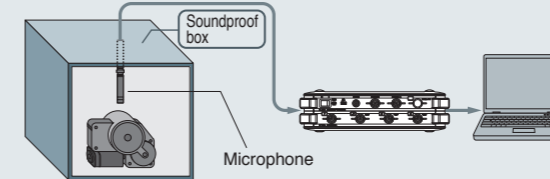
Application ❶
Automatic data recording of unexpected abnormal vibration and sound

This example shows how to record and save the power spectrum data of each channel automatically when vibration or sound exceeds the specified amplitude.
Using the trigger function and automatic measurement function, phenomena can be captured reliably and repeatedly.

● **Vibration measurement of bearing**
Accelerometer
Accelerometer
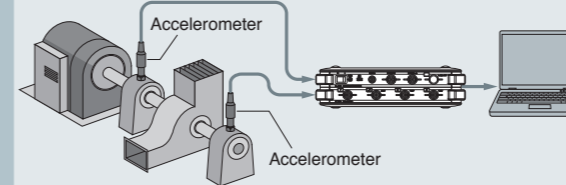
● **Sound measurement of electric component**
Soundproof box
Microphone

Application ❷
Automatic repeat measurement at the specified same time interval

Repeated measurement can be performed automatically by specifying day and time of measurement start and measurement interval. Measurement end time and data can also be set.

● **Sound and vibration measurement from wind power generation system**
Class 1 Sound level meter
Microphone
Accelerometer (tri-axis)
Accelerometer (single-axis)
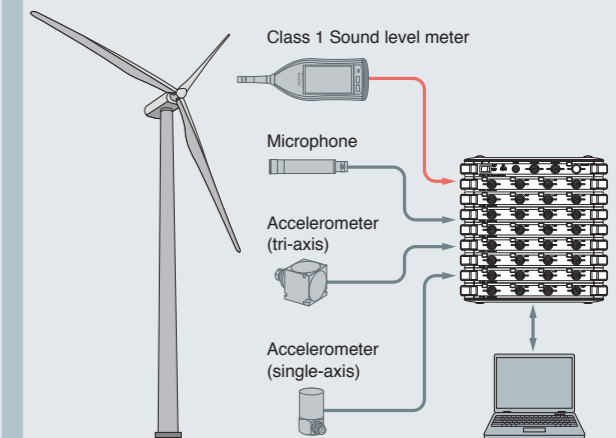
Function ❸ Mouse gesture function

This function enables various operations including X-scale enlargement and Y-scale adjustment only with a mouse. The band you want to measure or gain can be enlarged or reduced with ease and intuitive action. Y-scale also can be adjusted by mouse operation, just double-click the graph.

GOOD
Easy operation only with mouse

Previous method
Input of setting values is required to expand the axis and adjust the scale
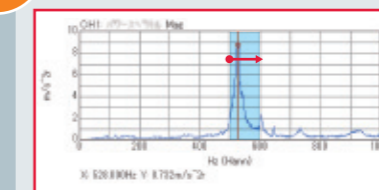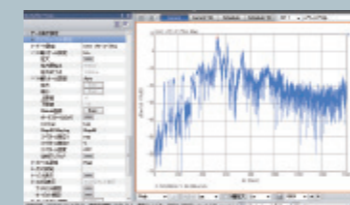
Slide a pointer aside
Selected X-axis range is expanded

Double-click on a graph
Y-axis scale is adjusted automatically

Drag a pointer to scroll an axis
The reference on the axis is moved to adjust

Data transfer to the OS-2000 Series with a single-button operation

Data recorded on the DS-3000 Series Data Station can be immediately transferred to the OS-2000 Series Time-Series Data Analysis Software.
Huge amount of recording files can be transferred by one operation.

【Advantages】
● **You can immediately check the recorded data.**
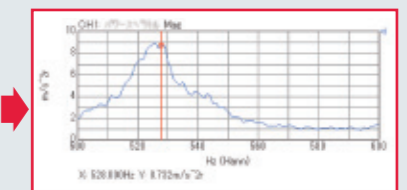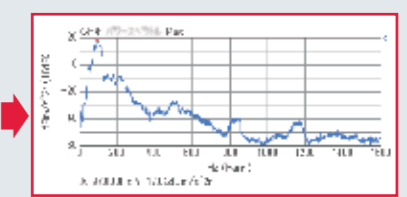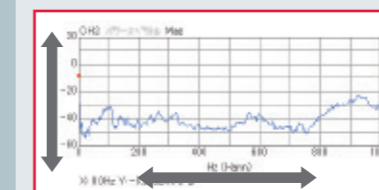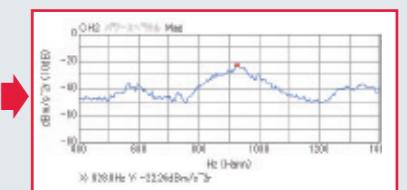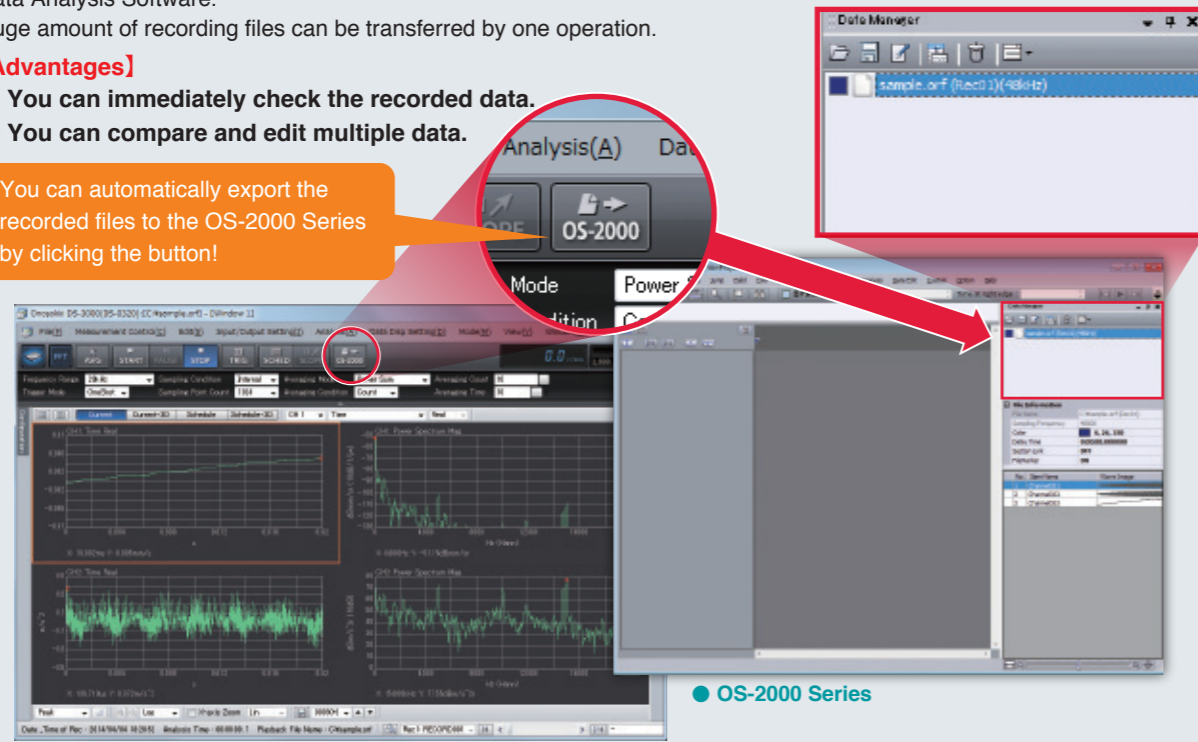● **You can compare and edit multiple data.**

You can automatically export the recorded files to the OS-2000 Series by clicking the button!

● **OS-2000 Series**

● **DS-3000 Series**

DS-3000 Series
Saves multiple data after recording and analyzing.

OS-2000 Series
You can immediately compare the recorded data and analyze in detail!

* DS-0350 (Recording Function) is required.
* DS-3000 Series software version: 2.2.6 or later
* OS-2000 Series software version: 2.7.0 or later

DS-0325A Tripartite graph function

Three amplitude values (acceleration: m/s^2, velocity: m/s, and displacement: m) at any arbitrary frequency can be read simultaneously in real time during FFT analysis of vibration. You do not need to perform calculus processing with the frequency analysis function individually, convert the amplitude value. Therefore you can read three amplitude values quickly.

* In a tripartite graph, amplitude values of acceleration (m/s^2), displacement (m) and velocity (m/s) which is based on, are read on the frequency axis.
* DS-0321A FFT Analysis function software is required.

If you want to know both the displacement and the velocity from the measurement result of the accelerometer...
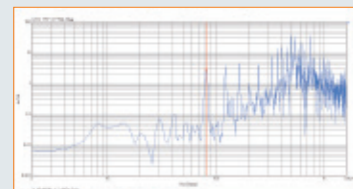
Previous method
You had to operate differential and integral calculus from the data which you measured.

Acceleration (m/s^2) | Velocity (m/s) | Displacement (m)

GOOD
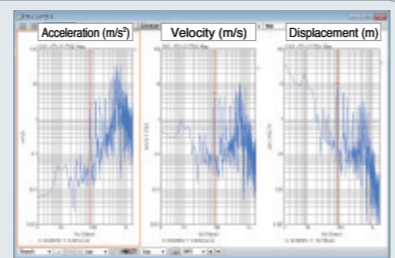
Real-time tripartite graph
Three amplitudes (velocity, acceleration, and displacement) can be read out in a same graph.

Displacement (m)
Velocity (m/s)
Acceleration (m/s^2)
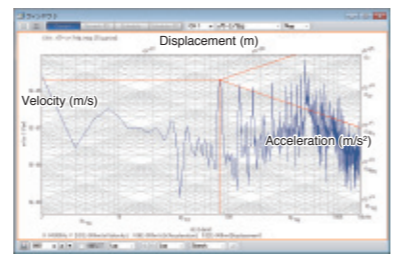
File viewer function

This function displays entire range of the file (ORF file) being analyzed offline.

【Advantages】
● **You can select the analysis range.**
● **You can convert the recorded data into TXT format or WAV format file.**
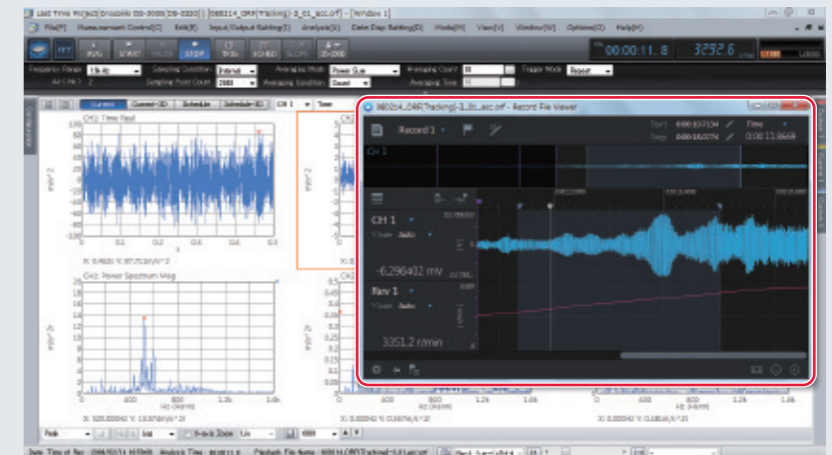
* Up to 40 GB of consecutive ORF files can be displayed.

Common setting function for multiple selections

You can select multiple screens or channels that you wish to change setting using [Ctrl] or [Shift] keys, and change them to common settings at once.

【Advantages】
● **Easy to change the setting for multiple screens or channels.**
● **Prevent from missing or loss of settings.**
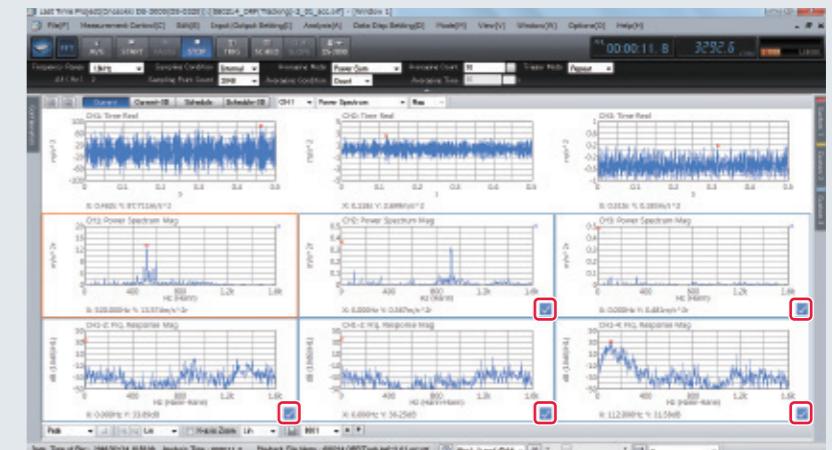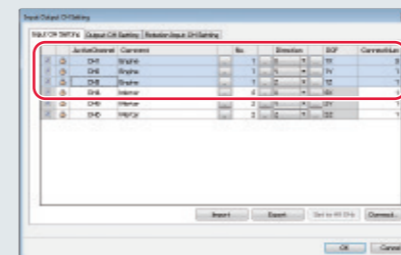
Enhanced saving function

Large amount of data can be saved at once with one button operation.

【Advantages】
● **Up to 3200 data can be saved at once.**
● **Saved contents can be displayed in list and output to files.**
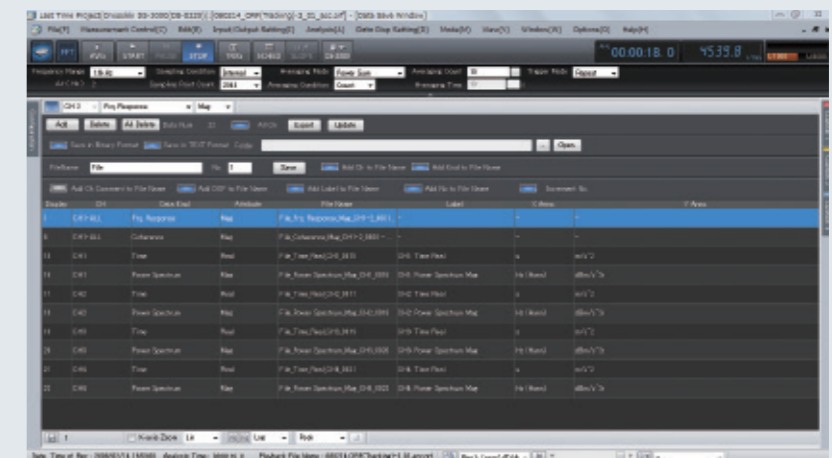
❶ Measuring sound

FFT analysis and octave analysis of sound   Air conditioner, office automation equipment etc.
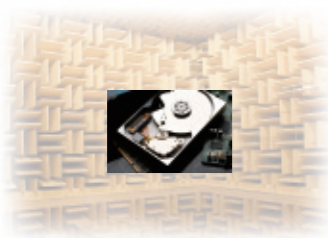
[Hardware]
By means of fanless design* with low noise from the main body, a very tiny sound can be analyzed with high accuracy, even when the main unit is set nearby the measurement target.

[Software]
Enables an automatic recording of backup data while performing FFT analysis or octave analysis. You can analyze the recorded data off-line (later) with a PC.

* Cooling fan is provided as standard with the following system
  40 kHz unit : 5 units or more system at rear side
  100 kHz unit: 4 units or more system at rear side

Time waveform (upper row) and power spectrum (lower row)

1/3 real-time octave analysis

A-weighted sound pressure level trend
The level change at optional specified frequency is displayed.
*Both DS-0322 and DS-0323 are required for level trend display and color mapping display.

[What is real-time octave analysis?]
The octave analysis is a core method for acoustic measurement in various industries and studies. An octave means twice of the frequency. As its scale is similar to that of the human auditory sense, the octave analysis is commonly used for noise analysis .
In this example, sound pressure level for each frequency band in the audible frequency range of the measurement target is obtained by using 1/1 filter or 1/3 filter, which is specified to a standard.
Real-time octave anaslysis enables the analysis and trend measurement with time-weighting (Fast, Slow, etc.) equivalent to that of sound level meters.
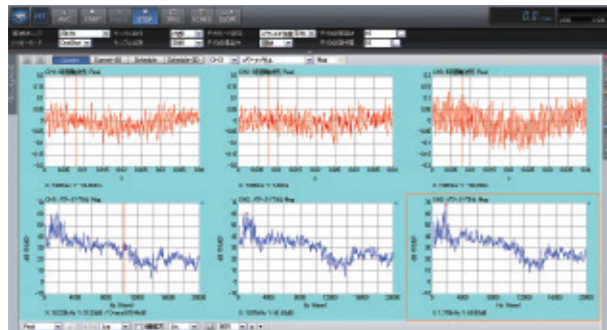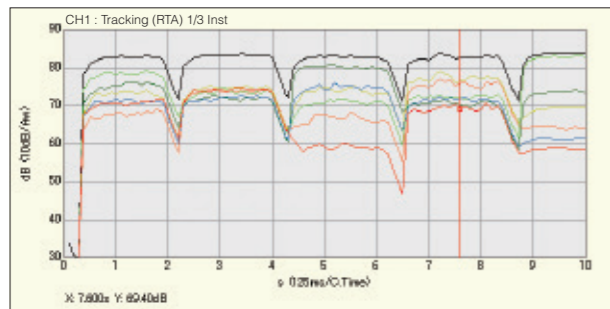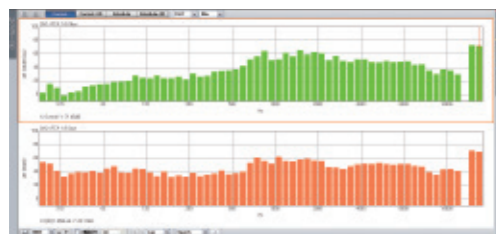

1/6 real-time octave analysis
*DS-0324 is required.
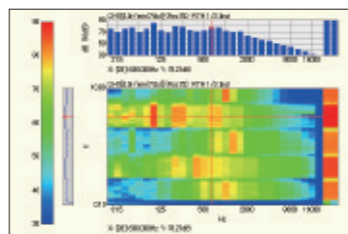
Color mapping display

Overlay display

System configuration

1/2-inch Measurement Microphone
Microphone Preamplifier
DS-3000 Series hardware
Notebook PC
Sound Level Meter
DS-0321A FFT
DS-0322 Tracking
DS-0350 Recording
DS-0323 Real-time Octave
DS-0324 1/N Real-time Octave
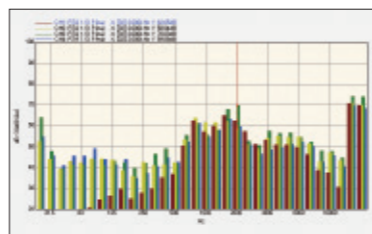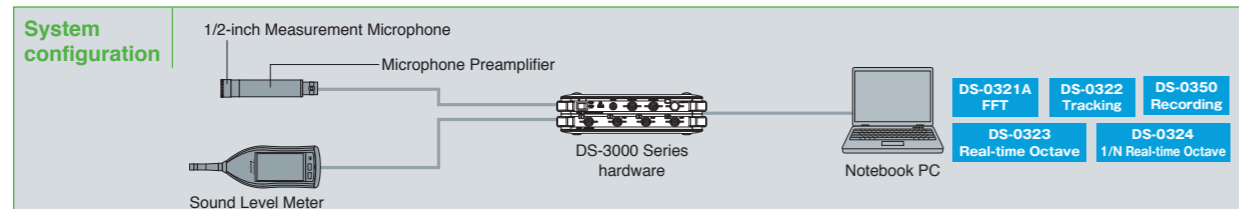
❷ Rotation tracking analysis

Rotation tracking analysis of noise and vibration   An engine and a transmission of a car, a power generator turbine, and a motor shaft
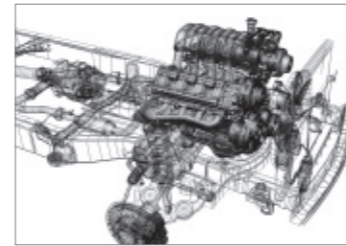
The DS-3000 Series enables tracking analysis from 60 to 240,000 r/min* rotation speed and can be used for measurement from low to high-speed rotation. Changes in the order component of sound and vibration when the rotation speed is changed can be displayed in a tracking diagram. Up to 8 lines can be superimposed on a tracking graph.
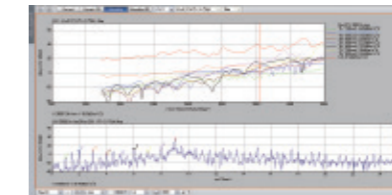
Tracking diagram
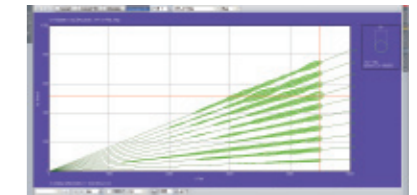
Campbell diagram
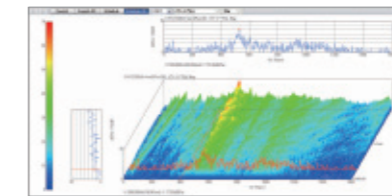
3D array display

Color mapping display

System configuration

Accelerometer
1/2-inch Measurement Microphone
Microphone Preamplifier
Handheld Digital Tachometer
DS-3000 Series hardware
Notebook PC
DS-0321A FFT
DS-0322 Tracking
DS-0350 Recording
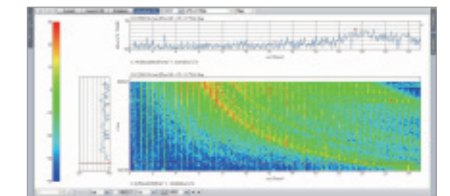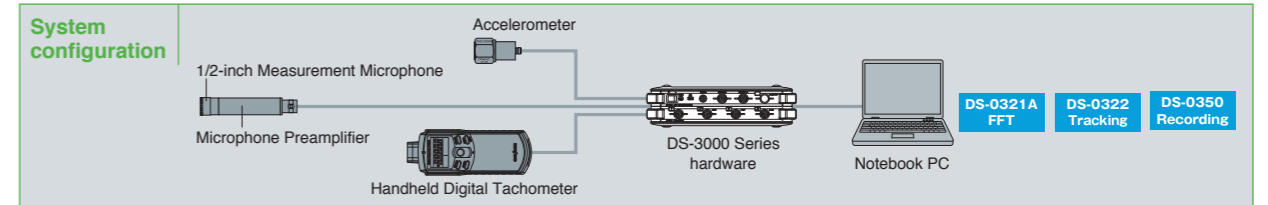
❸ Vibration measurement in a range of ultrasonic

Vibration measurement in a range of ultrasonic using a Laser Doppler Vibrometer   An inverter, a bonding machine, and an ultrasonic cleaning tank

By using the 100 kHz unit of the DS-3000 Series and the LV-1800 Laser Doppler Vibrometer, you can perform vibration measurement in a range of ultrasonic such as inverters, piezoelectric elements, MEMS, ultrasonic elements etc.
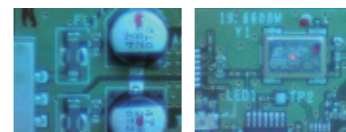
Images by the LV-0181 Built-in Positioning Camera of the LV-1800.

Laser Doppler Vibrometer LV-1800

Detection frequency range	0.3 to 3 MHz (fc=-3 dB)
Maximum detection velocity	10 m/s 0-p (20 m/s p-p)
Minimum velocity resolution	0.3 μm/s or less (when at 0.01 (m/s) /V)
Conforming standards (Laser safety standards)	FDA 21CFR Part 1040.10 (CDR H)
	IEC60825-1: 2007 class 2
	JIS C 6802 class 2

System configuration

[Measurement object] Bonding machine Ultrasonic head part
Sensor head
Laser Doppler Vibrometer
DS-3000 Series hardware (100 kHz unit)
Notebook PC
DS-0321A FFT

④ Measurement of frequency response function

Measurement of natural frequency / damping ratio [Parts and materials for automobile]

Measurement of natural frequency of the target object and calculation of the damping ratio by the half-width method are allowed by using the impulse hammer and the accelerometer.

Measurement object
Accelerometer
Impulse hammer

DS-3000 series
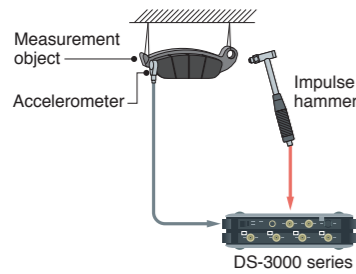
Make the condition to the free vibration state by suspending the measurement object or placing it on soft materials.

Strike the object by the impulse hammer to generate free damping vibration.

Detect the free damping vibration with the accelerometer.

Frequency response function (= acceleration (A)/ force (F), accelerance or inertance) of striking force (F) and acceleration (A) is obtained by detecting the free damping vibration.

From the result of the frequency response function, you can read the peak resonance frequency and obtain the natural frequency.

System configuration

Accelerometer
Impulse hammer
DS-3000 series hardware
Notebook PC
DS-0321A FFT

ONO SOKKI's analysis systems have been evolving for over 3 decades

Analyzing speed

DS-3000 (year 2018-) "For multi-channel measurement"

DS-3000 (year 2010-) "For on-site measurement"

CF-4700 (year 2015) "2ch pass/fail judgment on production line"

CF-9400 (year 2014) "Innovative features in a tough body"

DS-2000 (year 2000) "Compact chassis"

NEW CF series (All-in-one FFT)

CF-4500 (year 2009) "1ch pass/fail judgment on production line"

CF-7200 (year 2006) "2ch compact A4 size"

CF-3600/3800 (year 2004-) "Touch panel & all-in-one (4ch/8ch)"

DS-9100 (year 1995) "Up to 32ch PC base"

DS series (PC base FFT)

CF-6400 (year 1990) "4ch best quality"

CF-5220 (year 1994) "1/N real-time octave analysis"

CF series (Initial stage of FFT)

CF-350 (year 1987) "Adoption of 2ch FFT-DSP"

Measurement channel

Use of unit connection function FRAME LINK2

Multi-channel measurement system can be temporarily built by using unit connection function. The DS-3000 series hardware you already have can be efficiently used.
Up to 4 units of 32ch DS-3000 series are able to be connected and max. 128ch data can be obtained at once. (FRAME LINK2)

⑤ Visualization of sound in closing door of a vehicle

Sounds and vibrations that occur when closing a door are transient phenomena, not reproducible. In order to visualize the sound source position and the vibration state of such a transient phenomenon, it is necessary to measure many points at the same time. When you need to measure with multiple channels like this, the unit connection function (FRAME LINK2) is effective.

Sensor mounting position

Accelerometer
Ultraminiature microphone

80 Hz

120 Hz
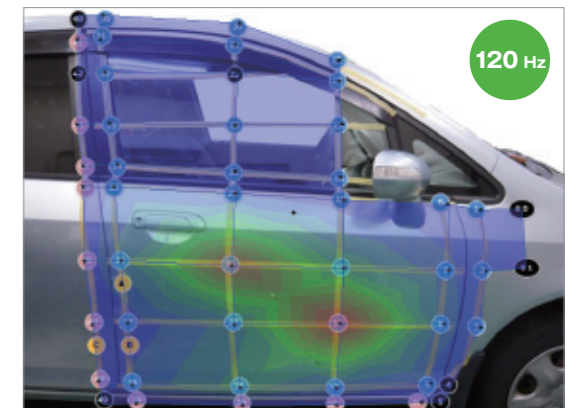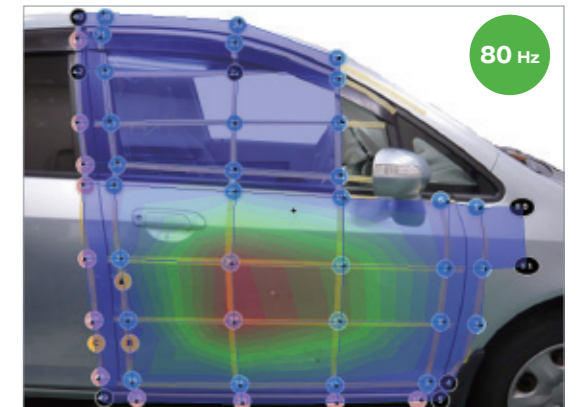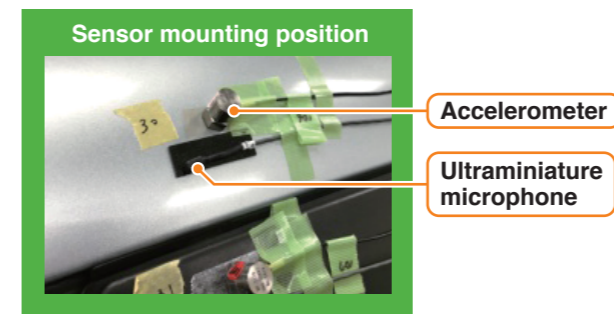
⑥ Sound pressure map of a vending machine

Multi-channel measurement using FRAME LINK2 enables measurement of sound and vibration for 40 points at once, greatly improves work efficiency. It is not necessary to measure many times while changing measurement points.
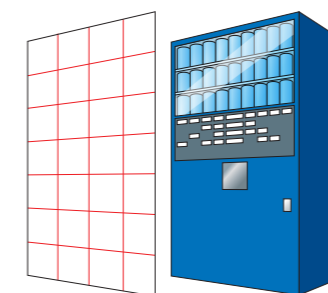
Measures sound pressure of 40 points
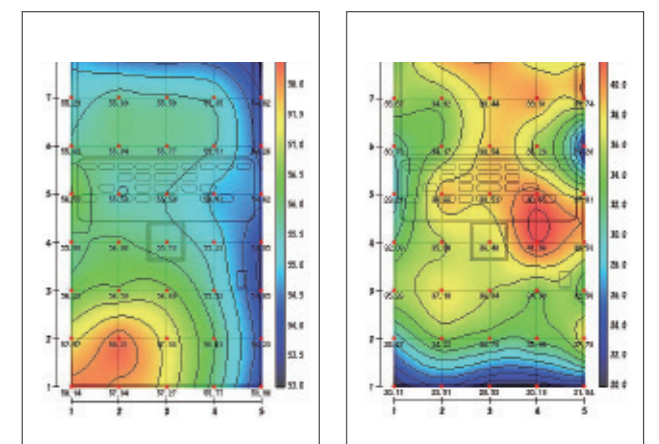
Sound pressure map of overall value

Sound pressure map of 441 Hz

System configuration

Accelerometer
Ultraminiature microphone
DS-3000 series hardware
FRAME LINK2
Notebook PC
DS-0321A FFT
DS-0350 Recording
OC-1330

* FRAME LINK2 supports 40 kHz unit only.
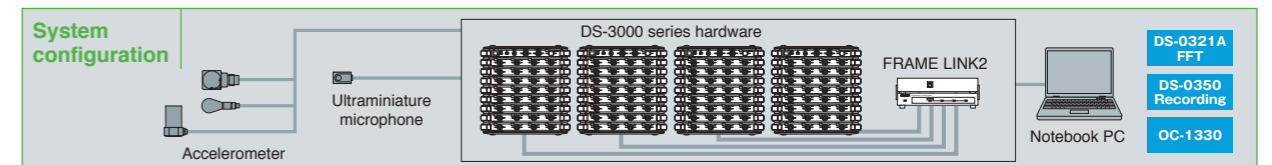
Servo Analyzer (DS-0342) Frequency Characteristics Analyzer

The Servo Analyzer is software that measures the transfer function (frequency response function) of electric control circuits and mechanical system. The characteristics of the control circuit (phase margin, gain margin) , resonance frequency of the structure, and impedance are able to be measured.

Graph switching with just one click operation

Bode graph

Nyquist graph

Time waveform

Power spectrum

Real-time monitoring of signal under measurement

Servo & sound / vibration analysis — Increased in performance

Just by selecting the measurement mode, the machine control characteristic measurement (servo analysis software DS-0342) and noise vibration measurement (FFT analysis software DS-0321A) can be switched.
For example, between FFT analysis of shake correction control characteristics of camera and servo analysis of mechanical control characteristics can be easily switched.

Sound/Vibration measurement (FFT Analysis)

Mechanical control characteristics measurement (Servo analysis)

●Measurement object: Digital camera
・Motor sound/ vibration measurement
・Camera shake correction control characteristic

●Measurement object: Electrical parts
・Vibration test using exciter
・Sound when mounting it to the vehicle vibration

Two types of calculation mode (FRA mode, FFT mode)

●FRA mode
The gain and phase for each single frequency can be obtained by this method. Used when high accuracy measurement with wide dynamic range are required.

●FFT mode
Gain and phase can be obtained with high speed. Used for the measurement when short time processing of wide band is required.

e.g.) FRA mode (Measurement time: 100 seconds) Log Sin sweep excitation

e.g.) FFT mode (Measurement time: 3 seconds) Random excitation.

* FRA (Frequency Response Analyzer), FFT (Fast Fourier Transform)

Useful functions — Increased in performance

●Auto resolution control function
This is a function that increases the frequency resolution near a sharp peak automatically. You can obtain accurate result in short time. It enables efficient measurement, and prevents overlook of a peak.

●-3 dB Auto search function
This is a function to automatically search the -3 dB lower points than the reference value selected with the cursor.

---

❼ Measurement of resonance frequency using an exciter

Excitation control measurement of electrical equipment substrate using the laser Doppler vibrometer — Electrical parts / Substrate

This example shows the frequency characteristic measurement of electrical parts embedded in the electronic substrate.
The DS-3000 series controls exciter so as to give a constant amplitude to the electronic substrate.
Physical values to be controlled to constant amplitude can be selected from "acceleration" "velocity" "displacement". By using Laser Doppler Vibrometer, vibrations of tiny electronic components mounted on a substrate can be detected by non-contact method.

Control of output amplitude

Set the channel which amplitude output is controlled to be constant.

Select physical quantity to be controlled (acceleration/ velocity/ displacement)
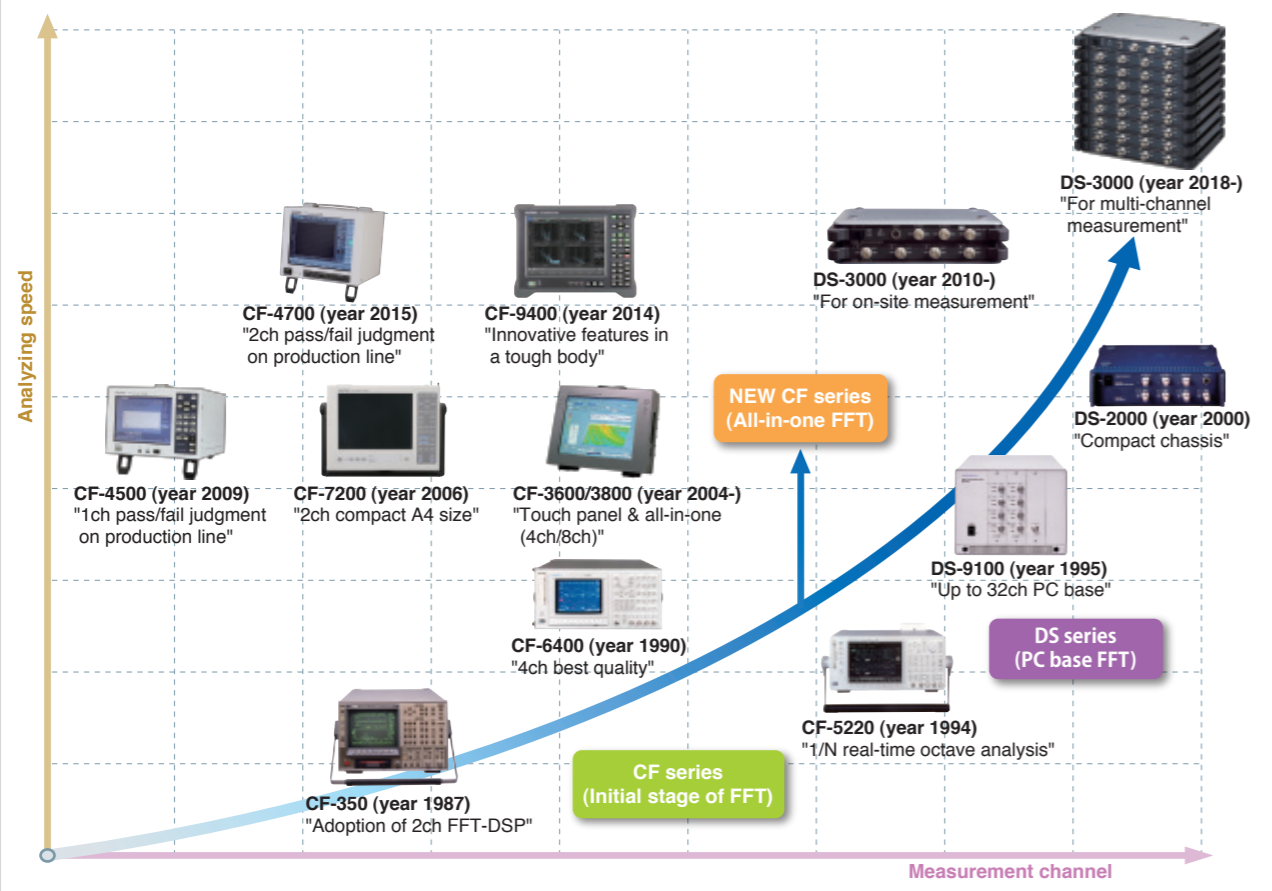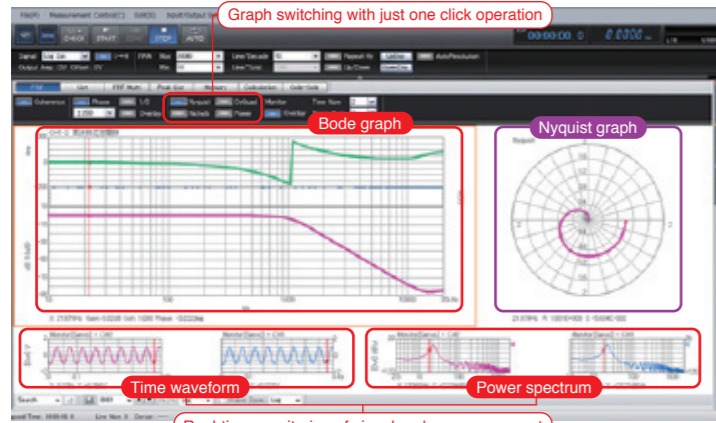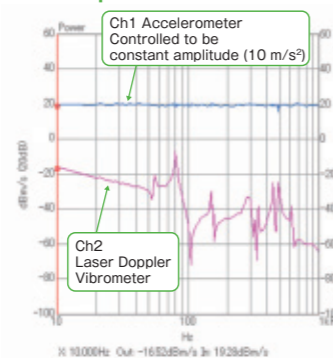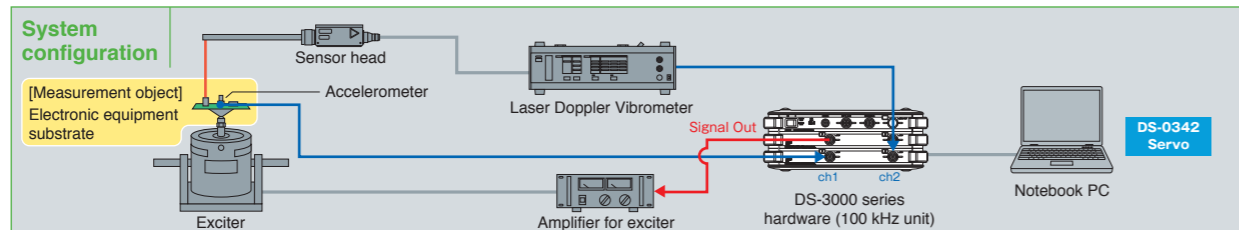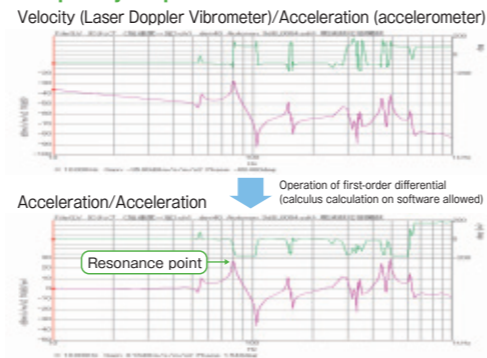
Set the operation mode, target value, allowable value

Display the target value

Power spectrum

Ch1 Accelerometer Controlled to be constant amplitude (10 m/s^2)

Ch2 Laser Doppler Vibrometer

Frequency response function

Velocity (Laser Doppler Vibrometer)/Acceleration (accelerometer)

Acceleration/Acceleration

Operation of first-order differential (calculus calculation on software allowed)

Resonance point

System configuration

[Measurement object] Electronic equipment substrate

Sensor head

Accelerometer

Laser Doppler Vibrometer

Signal Out

Exciter

Amplifier for exciter

ch1 ch2

DS-3000 series hardware (100 kHz unit)

Notebook PC

DS-0342 Servo

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❽ Measurement of control characteristics (gain margin, phase margin)

Measurement of rotation control characteristics of a motor using addition function (option) — Motor, actuator

Motors incorporated in various products such as industrial equipment and automobiles have control circuits (closed loop circuit) for controlling rotation speed, torque, etc.
When evaluating this control characteristic, in general, gain margin and phase margin are measured as the evaluation parameters of the controlling stability. By using the DS-3000 servo analysis system, this evaluation can be performed with ease and high accuracy.
Open loop characteristics and close loop characteristics can be converted with respect to data after measurement by calculation function.
The DS-0374 addition function option can output the signal obtained by adding a noise signal (for frequency response function measurement) from the DS-0373 (1ch output unit) to the feedback signal is output.

Addition function (DS-0374): option

Addition function option (DS-0374)

DS-0373 1ch output unit
Signal generation circuit
Addition circuit
MIX OFF
MIX ON
MIX IN (Control signal)
Signal Out (Control signal + disturbance signal)
Option (DS-0374)
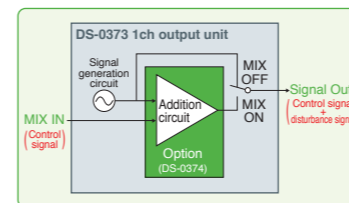
This function outputs the signal with the noise signal (for frequency response function measurement) added to the feedback signal from the main unit .
No need for the addition amplifier connection and cable wiring separately, and the noise immunity is improved.

* Only added to the DS-0373 (1ch 100 kHz unit).
* Ground of MIX IN and Ground of Signal Out (0 V) are connected in the DS-3000 hardware (100 kHz unit) .

Image of measurement result — Gain margin and phase margin can be searched automatically.

Phase margin
Phase (deg)
Phase1
Gain margin
Gain1
Gain (dB)

System configuration

[Measurement object] Motor & Driver

Signal Out (Feedback & Noise)

ch1 ch2

Feedback Sig.

DS-3000 series (100 kHz unit) with Addition function (option)

Notebook PC

DS-0342 Servo

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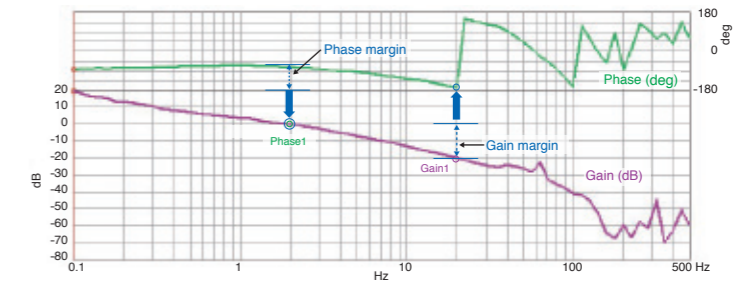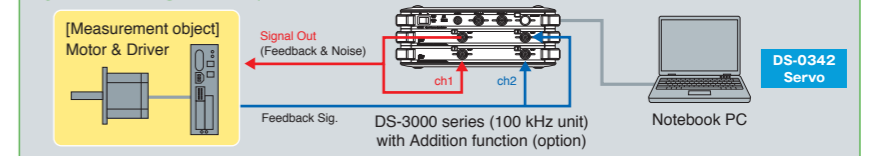
❾ Measurement of acoustic frequency characteristics

Measurement of speaker frequency characteristics using high sensitive microphone — Speaker, headphone

The frequency characteristics of the speaker etc. can be easily measured.
Connect the DS-3000 output signal to the amplifier for the speaker.
↓
Measure the speaker sound by the sound level meter or the microphone.
Phase rotation can be corrected by the delay amount between channels using the "Phase rotation calculation correction function" included.

Microphone and preamplifier (MI-1271, MI-3170)

Measurement result image

Microphone (MI-1271)	
Sensitivity	-26 dB ± 1.5 dB re. 1V/Pa 50 mV/Pa (1 kHz)
Frequency range	1 Hz to 20 kHz (± 2 dB)
Inherent noise level (A-weighting)	14.0 dB （Representative value, when using MI-3170）

System configuration

[Measurement object] Speaker

Measurement microphone

Microphone preamplifier

Amplifier for speaker

Signal Out

DS-3000 series hardware

Notebook PC

DS-0342 Servo
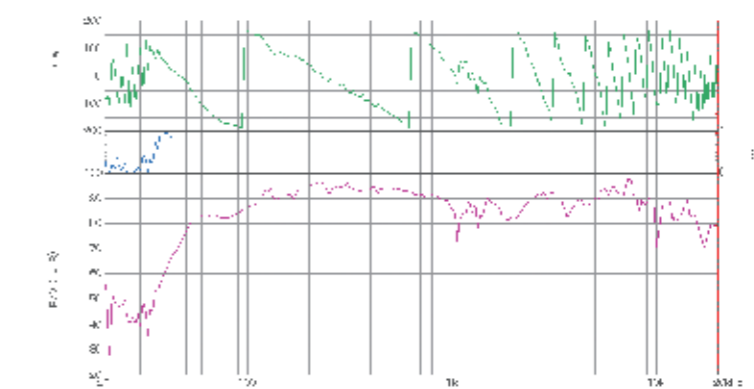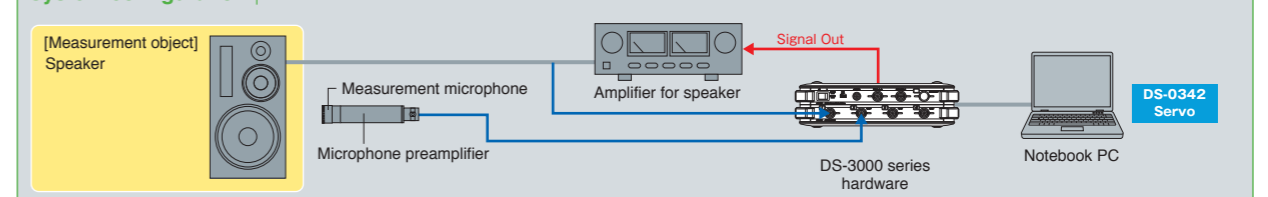
DS-3000 series

High performance

Quick & Easy processings
Measurement, recording, and analysis

O series

Further analylsis

Smooth and Effective
Organizing data and creating graphs

DAT *Data file of our FFT analyzer binary format

TLD *Schedule diagram data file of our FFT analyzer binary format

TRC *Tracking analysis data file of our FFT analyzer binary format

ORF *Our FFT analyzer time axis record file

OC-1300 series Toolbox

OC-1300 Toolbox enables data organization and graph creation by using data acquired by FFT Analyzer. Two kinds of software (DAT browser and TRC browser) support visualization of the acquired data.

■**DS-3000series Data file corresponding table**
DAT Browser: Time-axis waveform, power spectrum, bundled octave, Fourier spectrum, Tracking diagram, Frequency response function (Real, Imag, Mag, Phase), coherence, tracking, RTA (1/1, 1/3)

TRC Browser: Constant width (time, rotation), Constant ratio (time, rotation), octave (1/1, 1/3 (time, rotation))

DAT Browser OC-0340

DAT Browser can read up to 100 FFT data (DAT, TLD) stored in DS-2000/3000 series, CF-7200(A)/9200/9400, and PC at the same time and create them into graph. It enables data selection, differential and integral calculus, overlap drawing, and data output to OC-1300 series or output as image file such as BMP or metafile.

●**Simultaneous graph creation of up to 100 files of stored data**
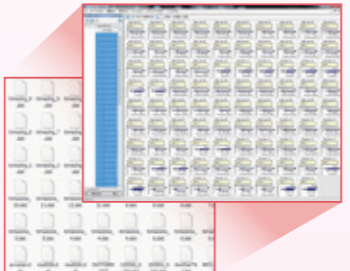
●**Overlapping of graphs is possible. Order lines are also superimposed.**
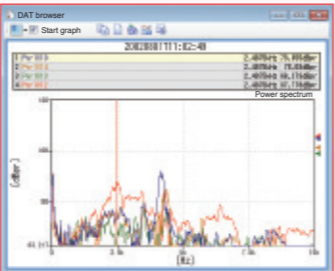
TRC Browser OC-0341

TRC Browser can create graphs by tracking data file (TRC) stored in DS-2000/ 3000 series, CF-7200(A)/ 9200/9400, and PC. Multiple tracking data files are imported and created as graphs in several windows.
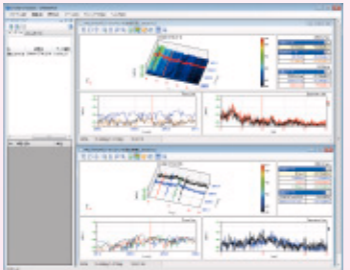
Model	Product name
OC-1340	Package for DAT/TRC Browser*1
OC-0320	Digital map*2
OC-0330	Cube controller*2
OC-0340	DAT Browser*2
OC-0341	TRC Browser*2

*1 OC-1340: OC-0340 + OC-0341
*2 OC-0320/0330/0340/0341 can be used independently.

OS-2000 series

The OS-2000 series features the ability to edit, process and analyze time-series data that are recorded by FFT Analyzer including DS-3000 series or CF-9200/9400. It also allows differential and integral calculus processing of recorded data and other complicated data processing and analysis, including reproduction and filtering of recorded sounds, analysis of fluctuation sounds. Various data formats* including original data formats of other companies are supported.

* gbd (GRAPHTEC corporation), hdr/aqv (TEAC Corporation), mem (HIOKI E.E. CORPORATION), wvf/wdf (Yokogawa Electric Corporation)

●**Main screen**
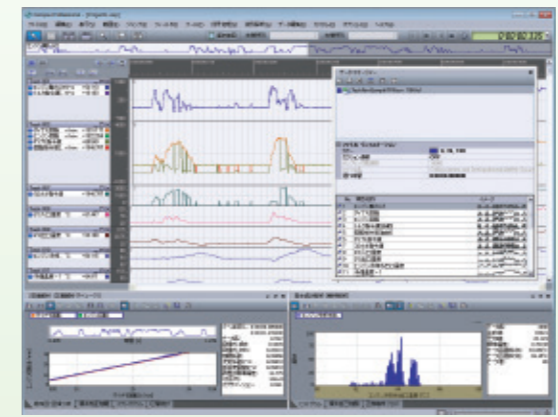
●**Tracking analysis**

●**Fluctuation sound analysis**
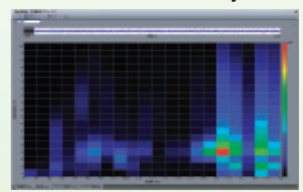
Model	Product name
OS-2500	Basic
OS-2600	Standard
OS-2700	Professional
OS-2710	Bench pack
OS-2720	FFT Analysis pack
OS-2740	Sound Quality evaluation pack
OS-2760	Fluctuation sound analysis pack

Model	Product name
OS-0251	Statistical analysis
OS-0252	FFT Analysis
OS-0253	FIR filter
OS-0261	IIR filter
OS-0263	Time frequency analysis
OS-0264	1/N Octave analysis
OS-0265	Tracking analysis

Model	Product name
OS-0254	Continuous automatic analysis
OS-0255	Combustion Analysis monitor
OS-0291	Non-time series graph
OS-0271	Sound quality evaluation
OS-0272	Fluctuation sound analysis
OS-0273	Fluctuation sound simulator
OS-0281	Video playback

EXPORT

EXPORT

OC-1300 series Graph Creation Tool

Graphs which have been created by OC-1300 Toolbox / OS-2000 series are exported to OC-1300 series only by one-click operation. Marker values, comment, and pictures are able to be added to make the graphs more impressive and beautiful.

The OC-1300 series makes it possible to create reports from huge amount of data smoothly and easily to anyone. You are able to lay out axis freely on a graph by dragging mouse and create graph easily. Even complicated multi-axis graph is able to be created quickly.

You can draw smooth contour map of sound pressure. By adding a contour map onto a loaded image data, the analysis result is obtained concretely.
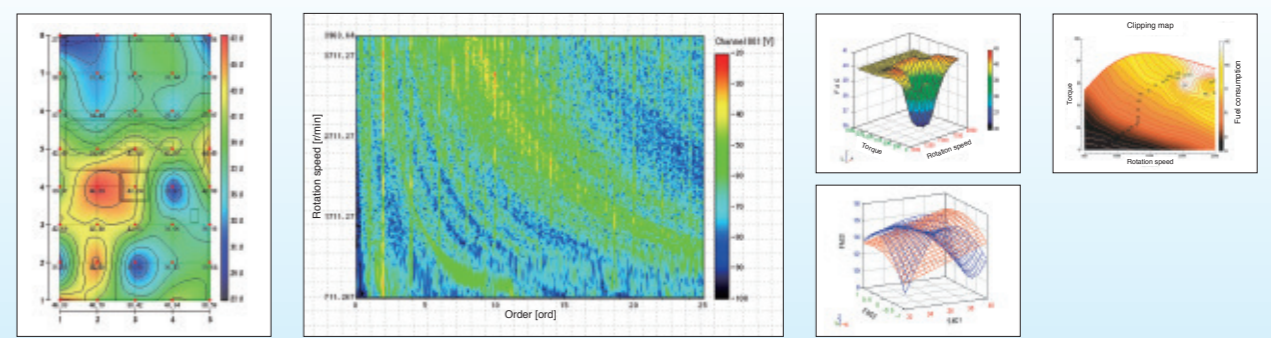
With wide variety of sensors, analyzers, and software, ONO SOKKI provides total solution on sound, vibration, and rotation measurement.

Vibration

Laser Doppler Vibrometer
LV Series
LV-1800

Accelerometer with Built-in Preamplifier
NP-3000 Series
Signal Cable
NP-0120/0130/0150/0170 Series
Miniature/BNC Conversion Adapter
NP-0021

Charge Output Accelerometer
NP-2000 Series
Signal Cable
NP-0120/0130/0150/0160 Series
Charge Converter
CH-6130/6140

Charge amplifier
CH-1200A

Tri-axial Accelerometer with Built-in Preamplifier
NP-3500 Series
Signal Cable for Tri-axial Accelerometer
NP-0232/0262

Impulse Hammer
GK Series
GK-2110/3100/4110G10
Signal Cable/Conversion Adapter

Sound

Sound Level Meter
LA Series
Signal Cable
AX-501
2.5φsub-mini plug / BNC connector

Measurement Microphone
MI-1271/1235/1433
+
**Microphone Preamplifier**
MI-3170/3111
Signal Cable
MX-1000/2000 Series

Ultraminiature Microphone
MB-2200M10

Rotation

Optical Detector
LG-9200
Signal Cable
MX-7100 Series

Magneto-electric Detector
MP-981/9820
R04-PB6F
D5-UL
(Composite 5-core vinyl sheath cable)
TM 1.25-3.5S

Digital Tachometer
TM-3100 Series
Signal Cable
MX-603+
MX-100 Series
TM 1.25-3.5S
P-2
(2-core outer shielded cable)
BNC jack

BNC Cable
(MX-100 Series)

Fiber Sensor Amplifier
FG-1300
+
Optical Fiber Sensor/Amplifier
FS-540/5500
BNC cable
(MX-100 Series)

Handheld Digital Tachometer
HT-5500
Signal Cable
AX-501
2.5φsub-mini plug / BNC connector

DS-3000 Series

Hardware

40 kHz unit

FRAME LINK2

100 kHz unit

USB cable

Notebook PC/Desktop PC

Software

FFT Analysis
DS-0321A

Tracking Analysis
DS-0322

Real-time Octave Analysis
DS-0323
DS-0324

Servo Analyzer
DS-0342

Recording Function
DS-0350

Analysis for special purpose

(for 40 kHz unit only)

3D Sound Intensity Analysis Software
DS-0225A

Sound intensity is the amount of acoustic energy of which the acoustic energy per a unit time emitted from a sound source passes through a unit area in sound field.
Measuring this amount in 3D achieves to predict the sound source position, measure the acoustic energy amount emitted from the sound source, and measure the direction of acoustic energy which passes through the measurement plane.

The flow of acoustic energy is visualized and overlaid on an image of the measurement object (vector mapping).

The intensity mapping of approx. 10 mm resolution is available.

Field Balancing Software
DS-0227A

The trouble of rotation machinery is caused most frequently by the phenomenon of an imbalanced rotating shaft.
The DS-0227A processes such bothersome balancing data calculation by software and displays the result. The correction of the imbalanced phenomenon can be made easily and efficiently.

Display of trial weight / correction weight position

Measurement screen

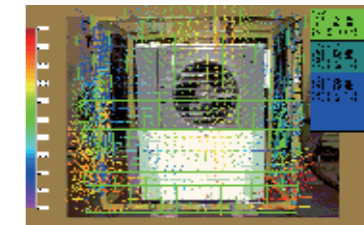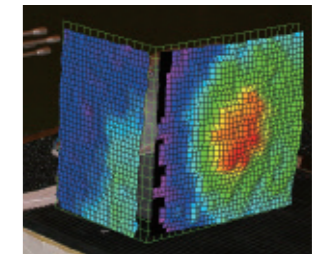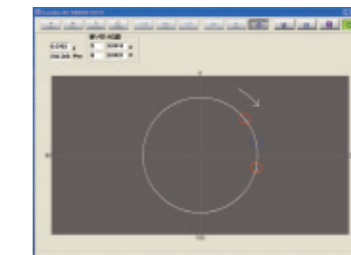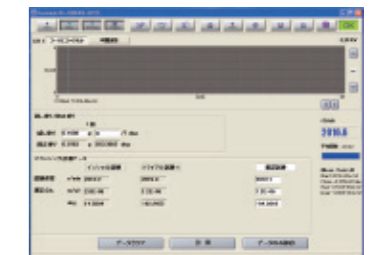### 4ch Beam Forming Sound Source Visualization System
BF-3200

The unique beam forming calculation method can achieve the same position resolution of the sound source as the existing 36ch microphone system with only four microphones. (in-house comparison).
Sound source search with analysis frequency of 500 Hz to 8000 Hz is possible, wider viewing angle measurement enables short-distance measurement, sound source conditions can be monitored in real time (more than 20 times / sec), and stationary sound and transient sound can be visualized.

Latch sound

Synthesized sound of door hitting sound and ground reflection sound

Visualize the closing sound of a vehicle door

Noise Testing Software
GN-1100 series

Noise Testing Software is a dedicated tracking software for sound and vibration analysis of rotating bodies. Ideal for 100% inspection such as vibration analysis of CVT (Continuously Variable Transmission) and parallel operation analysis of turbines.
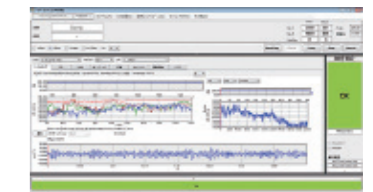
Mission noise tracking inspection

Tracks and analyzes transmission vibration signals and performs quality control with that result. Sets an optional judgment line in the tracking data to judge OK/NG.

DS-3200
TM-3100 series Digital Tachometer
NP-3000 series Accelerometer (with built-in preamplifier)
GN-1100
LG-9200 Optical Detector
MP-981/9820 Magnetic Detector

Tracking diagram
Vibration level
Rotation speed
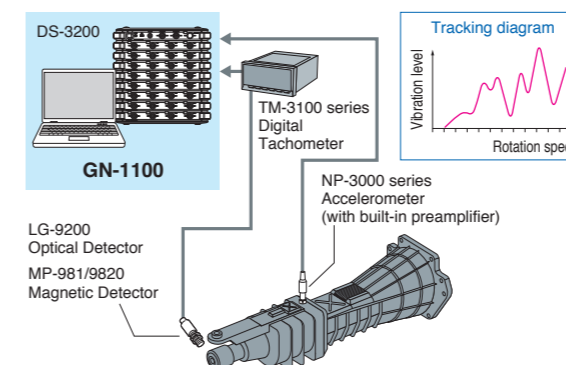
Unbalance inspection of turbofan

If unbalance occurs in the turbofan, vibration increases. You can judge the quality from the size of the generated vibration.

NP-3000 series Accelerometer (with built-in preamplifier)
DS-3200
GN-1100
OK/NG
PC
PLC
LAN, RS-232C output
Comparator output
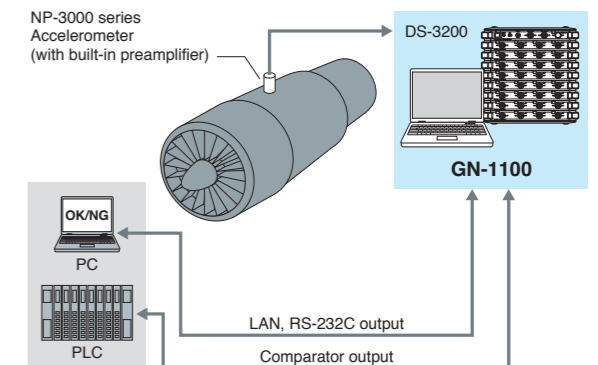
Hardware Specification

Each unit of the DS-3000 Series is just about the size of B5 and 30 mm in height. Input and output units can be stacked up to 8 units (40 kHz unit) or up to 5 units (100 kHz unit) depending on a use and a purpose. (Generally, they are stacked in order of the main unit, the output unit, and the input unit from the top.) We also provide the input main unit which stacks 2ch or 4ch input unit on a main unit, and you can add channels using it as a base.

Input main unit DS-3200 + (40 kHz 2ch / 4ch input unit, 100 kHz 2ch input unit)

	40 kHz unit	100 kHz unit
Model	DS-3202 (DS-3200 + DS-0362) / DS-3204 (DS-3200 + DS-0364)	DS-3200 + DS-0366
Frequency range	DC to 40 kHz	DC to 100 kHz
Number of processing channels	2ch to 32ch : The number of channels can be increased by the unit connection function. 4ch to 64ch (FRAME LINK) / 4ch to 128ch (FRAME LINK2)	2ch to 4ch (Unit connection function: not available)
External sample input	Voltage range ±12 V, 0 to 300 kHz (with out of band filter) Detection level -12 V to +12 V (0.025 V-step) / + (rising) or - (falling) 0.5 to 1024 P/R, 1 to 1024 with frequency dividing function When inputting rotation pulse (in the case of 1 P/R), range of detectable rotation speed: 60 to 192,000 r/min or 80 to 240,000 r/min	
External trigger input	Voltage range ±12 V, 0 to 300 kHz (with out of band filter) -12 V to +12 V (0.025 V-step) / + (rising) or - (falling) Repeat, single, one-shot: depending on software	
Monitor output	Input signal which is standardized by voltage range is outputted from the terminal on the rear panel of the input unit. (1 Vrms max.) *Monitor signal after filtering is output when sound filter is used.	
Terminal for monitor output	Φ3.5 stereo-mini jack Number of terminals: 1 (DS-0362), 2 (DS-0364) / input unit	Φ3.5 monaural-mini jack Number of terminals: 2 / input unit
PC interface	[DS-3200] USB 3.0 interface is built-in.	
Accessory	Instruction manual, AC adapter, power cable for AC adapter, USB 3.0 cable (2 m, with ferrite core)	

Common specification of units

	40 kHz unit	100 kHz unit
Power voltage / power consumption	100 to 240 VAC, 10.5 to 16.5 VDC / 25 to 95 VA (when 15 VDC)	100 to 240 VAC, 10.5 to 16.5 VDC / 25 to 55 VA (when 15 VDC)
Outer dimensions	269 (W) × 71 (H) × 267 (D) mm (including protruded section)	269 (W) × 71 (H) × 155 (D) mm (including protruded section)
Weight	Approx. 2.2 kg (4ch system: 2 units) to 8.2 kg (32ch system: 9 units)	Approx. 2.2 kg (2ch system: 2 units) to 4.6 kg (input 4ch + output 2ch system: 5 units)
Cooling fan	Required for a system of 5 units or greater. (Provided as standard with the system of 5 units or more.)	Required for a system of 4 units or greater. (Provided as standard with the system of 4 units or more.)
Operating temperature range	0 to +40 °C (with no condensation)	
Storage temperature range	-10 to +60 °C (with no condensation)	
Applicable standard	CE marking	

AC adapter specification (common to 40 kHz unit and 100 kHz unit)

	AC adapter 60 W type (PS-P20023B)	AC adapter 150 W type (PS-P20017D)
Input voltage / current	Rated 100 to 240 VAC (90 to 264 VAC), max. 1.4 A	Rated 100 to 240 VAC (90 to 264 VAC), max. 2.5 A
Output voltage / current	15 VDC / 4 A	15 VDC / 10 A
Number of applicable units	Up to 4 units	5 units or more
Safety standard	CE / UL / GS / PSE	

Input unit DS-0362 / DS-0364 / DS-0366

	40 kHz unit	100 kHz unit
Model	DS-0362 / DS-0364	DS-0366
Number of input channels	2ch / 4ch	2ch
Input terminal	BNC	
Input impedance	1 MΩ±0.5 % 100 pF or less	
Input coupling	DC or AC (-3 dB at 0.55 Hz)	
Isolation	Non-insulation	Insulated between each channel. (Permanently)
Power supply for sensor (CCLD)	Electric current is supplied to a constant current supply-type sensor through an input connector (BNC). +24 V / 4 mA	
TEDS function	Supports TEDS: IEEE 1451.4 Ver.0.9, Ver.1.0 accelerometer and microphone, IEEE 1451.4 Ver.1.0 force sensor	
Sound filter	A and C weighting (provided as standard) Conforms to IEC 61672-1: 2002 class1, ANSI_S1.4-1983 TYPE1, and JIS C 1509-1: 2005 class 1	
Input voltage range	10 mVrms to 10 Vrms (7-range, 10 dB-step)	
Input level monitor	Excessive voltage input turns on the red LED. (Lights when the voltage is 95 % or more of full scale range.)	
A/D converter	24 bits Type ⊿Σ	16 bits Type ⊿Σ
Accuracy between channels	Within ±0.3 dB, within ±0.4 deg (0 to 20 kHz) Within ±0.3 dB, within ±0.8 deg (20 to 40 kHz)	Within ±0.05 dB, within ±0.3 deg (0 to 20 kHz) Within ±0.1 dB, within ±0.7 deg (20 to 100 kHz)
Dynamic range	110 dB (40 kHz range, 1 Vrms range, when analyzed at 2048 points)	90 dB (100 kHz range, 1 Vrms range, when analyzed at 2048 points)
Outer dimensions	271 (W) × 28 (H) × 217 (D) mm (including protruded section)	
Weight	900 g or less	

Signal output DS-0371 / DS-0372 / DS-0373 (option)

	40 kHz unit	100 kHz unit
Model	DS-0371 (module) / DS-0372 (unit)	DS-0373 (unit)
Number of output channels	1ch / 2ch DS-0371 is built in the main unit of DS-3100 / DS-3200	1ch
Output terminal	BNC	
Output impedance	50 Ω±10 %	0 Ω or 50 Ω±10 %
D/A converter	24 bits Type ⊿Σ	16 bits
Isolation	Non-insulation	Insulated between each channel (Permanently)
Output voltage amplitude	±10 mV to ±10 V	±1 mV to ±10 V
Offset voltage	±10 V However, sum of the value of output voltage amplitude and the value of offset voltage is within ±10 V.	
Maximum output current	10 mA	
Frequency range	DC to 40 kHz	DC to 100 kHz
Output waveform	Sine wave, swept sine, random (decorrelation between channels), pseudo random, impulse, octave band noise, pink noise, recorded data (ORF format)	
Outer dimensions (unit)	271 (W) × 28 (H) × 217 (D) mm (including protruded section)	
Weight (unit)	900 g or less	

Addition function option DS-0374

	100 kHz unit
Model	DS-0374 (module)
Mounting type	Built in the DS-0373 Signal output unit
Number of input channels	1ch
Input terminal	BNC
Input impedance	1 MΩ±0.5 % 100 pF or less
Input voltage range	±10 V However, sum of the value of input voltage amplitude, the value of summation signal and the value of offset voltage are within ±10 V.
Input coupling	DC
Isolation	Insulated (Permanently) Summation input and signal output are insulated together from other input signals, etc.
Function	The function which inputs disturbance noise and outputs it after the addition to the preset signal.

Unit connection function (FRAME LINK2)

FRAME LINK2 can temporarily build up a multi-channel measurement system by connecting units of the DS-3000 series including the DS-0392A (Unit connection interface) to a PC with exclusive cables and the DS-0394 (Unit connection box). Up to four units can be connected. If USB terminals on PC side are not enough, you can use the DS-0393 (Unit connection USB hub) to connect multiple main units.

Unit connection interface DS-0392A (option)

Model name	DS-0392A (for DS-3200)
Connection cable (sold separately)	AX-9035 cable length 0.75 m AX-9036 cable length 2.00 m * Cannot be used with combination of different lengths
Applicable hardware	Connection between 40 kHz units (can be connected only between DS-3200) 100 kHz unit cannot be connected.
Applicable software	FFT Analysis (DS-0321A), Tracking Analysis (DS-0322), Recording function (DS-0350) * Real-time octave analysis (DS-0323), Servo analysis (DS-0342) are not supported.

Unit connection box (DS-0394) option

Number of connection units	Max. 4 units (DS-3200 with DS-0392A installed)
Applicable connection cable	AX-9035 or AX-9036
Connector	26 pin exclusive connector
Power supply / power consumption	Supplied from the DS-3200 connected to the UNIT 1 connector / 1.2 W or less
Outer dimensions	168 (W) × 25 (H) × 100 (D) mm (not including protruded section)
Weight	Approx. 450 g
Operating temperature range	0 to 40 °C (with no condensation)
Storage temperature range	-10 to 60 °C (with no condensation)
Applicable standard	CE marking

Unit connection box DS-0394

Unit connection USB HUB DS-0393 (option)

Connector	USB 3.0 (Type A) × 4, USB 3.0 (Type B) × 1
Power supply / power consumption	Bus power operation (supplied from personal computer) / 1.5 W or less
Outer dimensions	168 (W) × 30 (H) × 65 (D) mm (not including protruded section)
Weight	Approx. 400 g (with DS-0394 connecting jig)
Operating temperature range	0 to 40 °C (with no condensation)
Storage temperature range	-10 to 60 °C (with no condensation)
Applicable standard	CE marking

Upper unit: Unit connection USB HUB (DS-0393)
Lower unit: Unit connection box (DS-0394)

Outer dimensions

·Front view
[40 kHz]   4ch system   8ch system   16ch system   32ch system
(Unit: mm)
272 160 104 76 28

[100 kHz]   2ch input system   2ch input and 1ch output system
104 76 28

·Side view   ·Rear view   ·Top view   ·Rear view   ·Side view
180 217 257 271
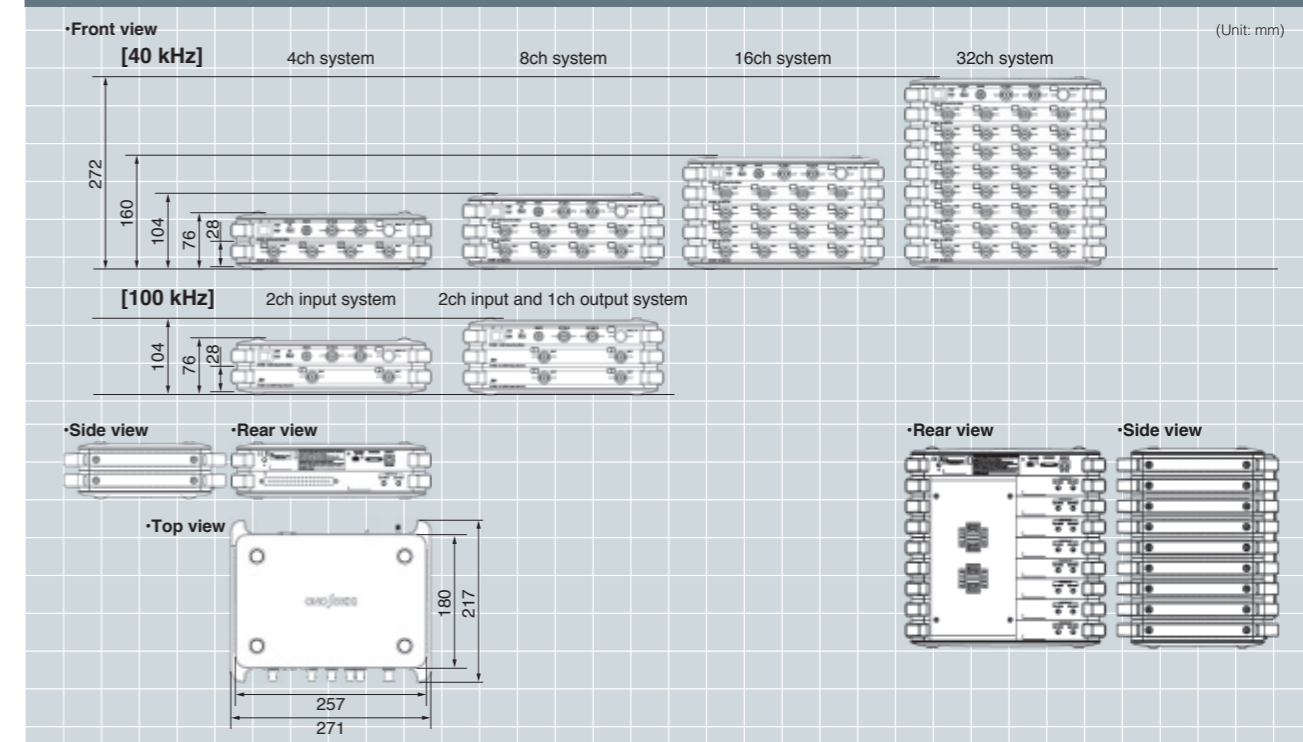
Notes on hardware specification
- 100 kHz unit and 40 kHz unit cannot be used together.
- The max. number of units for 100 kHz: [DS-3200 + (DS-0366 × 2) + (DS-0373 × 2)] (input 4ch, output 2ch)
- The DS-0371 is built in a main unit.
- The DS-0373 cannot be added to system without the DS-0366.
- The DS-0374 can be used only with the DS-0373
- For 40 kHz unit system: Fan is installed to the rear side in the 5 or more units system. (including a main unit).
  For 100 kHz unit system: Fan is installed to the rear side in the 4 or more units system. (including a main unit).
- Large size AC adapter (150 W type) is required when 5 or more units are assembled. (including a main unit).
- The DS-3200 USB 3.0 Interface cannot be used with a USB hub, USB protection key can be used with a USB hub.

- If you woud like to add hardware after the purchase, an extra fee for installation will be charged. For more details, please contact your nearest distributor or send an e-mail to us (overseas@onosokki.co.jp).

Notes on Unit connection function
- Unit connection function (FRAME LINK or FRAME LINK2) cannot be used for 100 kHz unit.
- FRAME LINK supports DS-3100 (previous model) and DS-3200 (current model).
- FRAME LINK2 supports only DS-3200 (current model).
- Only AX-9035 (0.75 m) unit connection cable can be used for FRAME LINK.
- AX-9035 (0.75 m) and AX-9036 (2 m) unit connection cables can be used for FRAME LINK2. Cables with different lengths cannot be used together.
- Unit connection interface (DS-0392A) supports FRAME LINK and FRAME LINK2. DS-0392 only supports FRAME LINK.
- DS-0321A (FFT Analysis Function) software license is required for FRAME LINK2. It does not operate with license of DS-0321 only.
- FRAME LINK2 should be operated in FFT-A analysis mode.

Software specification

You can build up the best system for on-site and real-time measurements based on a common screen structure and operability.

Starting or operating application software

Starting procedure	FFT analysis (DS-0321A/DS-0321), Tracking analysis, (DS-0322), RTA analysis (DS-0323), Recording function (throughput disk function) (DS-0350), Servo analysis function (DS-0342), can be selected on the activated basic software. Recording function (DS-0350) is operated with FFT (excluding constant ratio tracking) or RTA analysis.
Control of activation	The functions that are licensed in the USB protection key can be activated or used in analysis software
Basic operation	Operated by menu bar, tool bar, configuration bar, custom bar, and option bar. The layout / size of the configuration bar can be changed. Configuration bar can be selected from the menu bar. Commonly-used measurement setup items can be placed as tabs on the custom bar selected from the configuration bar. The layout / size of the custom bar can be changed. Show / hide of the option bar is selectable.
On-line analysis and off-line analysis	On-line analysis: Performs analysis while operating the DS-3000 hardware. Off-line analysis: Analyzes recorded measurement data. On-line or off-line analysis can be selected on the basic software. Both on-line and off-line analysis are available with the on-line analysis license.
Operation in the measurement window	Specified graph screens or all graph screens displayed in the window can be saved as files or taken as screenshots. Specified data screens or all data screens can be saved as files with arbitrary file names.

FFT Analysis function DS-0321A/DS-0321

	FFT-A mode (DS-0321A)	FFT mode (DS-0321)
Number of measurement channels	2 to 128ch	2 to 64ch
Unit connection	FRAME LINK2 supported (2 to 4 units connectable)	FRAME LINK supported (2 units connectable)
FFT real-time rate	100 kHz range: 2ch　50 kHz range: 4ch　40 kHz range: 16ch 20 kHz range: 32ch　20 kHz range: 64ch　10 kHz range: 128ch	100 kHz range: 2ch　50 kHz range: 4ch　40 kHz range: 8ch 20 kHz range: 16ch　10 kHz range: 32ch　5 kHz range: 64ch
Number of cross channels registered	1024 pairs	128 pairs
Frequency range	4 mHz to 40 kHz (40 kHz unit) 10 mHz to 100 kHz (100 kHz unit)	
Number of FFT samplings (number of spectrum lines)	64 points (25 lines), 128 points (50 lines), 256 points (100 lines), 512 points (200 lines), 1024 points (400 lines), 2048 points (800 lines), 4096 points (1600 lines), 8192 points (3200 lines), 16384 points (6400 lines)	
Window function	Rectangular, hanning, flat-top, force, exponential, and user-defined	
Averaging function	Time-axis summation averaging, time-axis exponential averaging, power spectrum summation averaging, power spectrum exponential averaging, etc.	
Analysis function (time-axis)	Time waveform, auto-correlation function, cross-correlation function, impulse resonse, cepstrum	
Analysis function (frequency-axis)	Power spectrum, Fourier spectrum, liftered spectrum, cross spectrum, frequendcy response function (FRF), coherent function, coherence output power	
Analysis function (time-axis statistical processing)	Mean value, absolute mean value, rms value, standard deviation, maximum value, minimum value, form factor, crest factor, skewness, kurtosis	
Analysis screen display	Up to 128 screens / 1 window (overlapping display in a window), up to 10 windows / up to 640 screens Up to 128 screens / 1 window with list display	
Cursor function	Search cursor, peak cursor, delta cursor	
List function	Peak list, harmonics (total harmonics, distortion) list, arbitrary list, all list	
Calculation function	Inverse Fourier transform, frequency calculus, Hilbert transform, opening and closing loop calculation, damping ratio calculation, FRF reciprocal calculation, four arithmetic operation	

Tracking analysis function DS-0322

Tracking analysis type	Amplitude tracking, phase tracking	
Sampling method	Constant ratio tracking (external sampling): up to maximum analysis orders Constant width tracking (internal sampling): Frequency range is same as its FFT analysis.	
Number of FFT sampling points	64 to 16384 points (power-of-two step)	
Averaging function	Power spectrum exponential averaging, Fourier spectrum exponential averaging	
Rotation two inputs	Recorded by selecting rotation ch 2-input in EXT TRIG IN function, and can be analyzed by selecting rotation reference signal.	
Maximum number of analysis orders	6.25, 12.5, 25, 50, 100, 200, 400, 800, 1600	
Maximum number of blocks	100, 200, 400, 800, 1000	
Schedule function	Rotation schedule (provided automatic falling determination function), time schedule (time trend)	
Rotation speed range	FFT-A mode (DS-0321A)	FFT mode (DS-0321)
	30 to 96,000 r/min or 60 to 192,000 r/min (1 P/R)	60 to 192,000 r/min or 80 to 240,000 r/min (1 P/R)
Upper / lower-limit setting of number of rotations	UP (lower limit→upper limit), DOWN (upper limit→lower limit), UP / DOWN (lower limit→upper limit→lower limit), DOWN / UP (upper limit→lower limit→upper limit)	
Tracking diagram	Up to 128 screens / 1 window（overlapping display in a window）, up to 10 windows / up to 640 screens Designated order 8 lines + MaxORD + OA + POA per 1 screen can be plotted.	
Averaging function of tracking diagram file	The function that specifies the tracking diagram data saved as files, then makes and displays an averaged tracking data from them.	
Tracking 3D display	1 window, up to 10 windows 1 screen / 1 window when 3D display 3D array display (monochrome / color), color mapping display, Campbell plot	

1/1・1/3 Real-time octave analysis software DS-0323

Number of measurement channels	2ch to 64ch
Unit connection	FRAME LINK supported (up to 2 units connectable) FRAME LINK2 not supported
Octave function	1/1 and 1/3 octave (filter: 6th order Butterworth) JIS C 1514: 2002 Class1, IEC 61260 Ed1.0 (1995) class1, ANSI S1.11:2004 Class1 By adding DS-0325 optional software, 1/N octave analysis can be used. 1/6, 1/12, 1/24 octave function However, the signals of 2ch from the left/each input unit (when using 4 ch input unit), and the signal of the leftmost channel / each input unit (when using 2ch input unit) can be analyzed.
1/N Octave function	By adding DS-0324 optional software, 1/N octave analysis can be used. 1/6, 1/12, 1/24 octave function However, the signals of 2ch from the left/each input unit (when using 4ch input unit), and the signal of the leftmost channel / each input unit (when using 2ch input unit) can be analyzed.
Time weighting (time constant)	10 ms, 35 ms, 125 ms (FAST), 630 ms, 1 s (SLOW), 8 s, IMPULSE (rising 35 ms/falling 1.5 s) JIS C 1509-1: 2005 Class1, IEC 61672-1: 2002 class1
Frequency range	1 to 16 kHz (1/1 octave), 0.5 to 20 kHz (1/3 octave), 0.732 Hz to 21.36 kHz (1/6 octave), 0.711 Hz to 20.75 kHz (1/12 octave), 0.701 Hz to 17.20 kHz (1/24 octave)
Calculation function	Instantaneous value, maximum value of every 1 second, maximum value hold, minimum value hold, power averaging value, power sum value, Linear Leq operation
Analysis screen display	Up to 128 screens / 1 window (overlapping display in a window available), up to 10 windows / up to 640 screens
Octave tracking function	Can be used by adding DS-0322 optional software Tracking analysis function in octave band available (required for rotation tracking and time trace processing)
List function	Peak list, arbitrary list, all list

Recording function (Throughput disk function) DS-0350

Recording function	The digital signal after A/D conversion of the analog signal can be continuously recorded to the hard disk of the personal computer. Recording available in the recording mode.	
Simultaneous analysis recording function	Available in FFT mode, FFT-A mode, RTA mode	
Frequency range / channel	Recording mode (only recording)	100 kHz range/4ch, 40 kHz range/16ch, 20 kHz range/32ch, 10 kHz range/64ch
	FFT mode (simultaneous analysis recording)	100 kHz range/4ch, 40 kHz range/16ch, 20 kHz range/32ch, 10 kHz range/64ch
	FFT-A mode (simultaneous analysis recording)	100 kHz range/4ch, 40 kHz range/16ch, 20 kHz range/32ch, 20 kHz range/64ch, 10 kHz range/128ch
	RTA mode (simultaneous analysis recording)	25 kHz/24ch
Recording sampling frequency	Frequency range × 2.56 Hz	
Recording file format	ORF file (Ono Sokki Original Format): rotation information recording available	
Continuous recording	Even after reaching the limit of the recording capacity of ORF file (4 G), continuous recording without data missing is available by switching the save destination to a new file to record.	
Conversion function	File export function: TXT format WAV format	

[Servo Analysis System]

Hardware specification   * Unit connection function: not supported.

Input function (Servo Analysis System)

Measurement unit, Number of measurement channels	40 kHz unit	100 kHz unit
	2 to 32ch	2 to 4ch
	DS-3202, DS-3204, DS-3102, DS-3104	DS-3200+DS-0366, DS-3100+DS-0366
	* Measurement condition is changed depending on the number of channels.	
Unit connection	Only one unit	
Coupling	AC/DC switching With coupling automatic switching function	
Voltage auto range function	The voltage range of each channel is automatically selected optimally according to the level of the input signal while measuring.	
Dynamic range	140 dB (FRA mode, 100 kHz unit/40 kHz unit) 90 dB (FFT mode, 100 kHz unit) 110 dB (FFT mode, 40 kHz unit)	

Signal output function (Servo analysis system) *Signal output function is required for servo analysis system.

Output function, Number of output channels	1ch
	DS-0371 module/DS-0372 unit (40 kHz), DS-0373 unit (100 kHz) * 100 kHz unit: Isolated between each channel
Type of output signal	Sine sweep (log/linear)/ Swept sine/Random/Pseudo-random/Impulse
Output voltage	Combine the offset voltage and amplitude: Max. ±10 V, Min. ±10 mV or less Output is OFF in the stop state
Offset voltage regular output function	Function that always outputs offset voltage value even in the stop state.
Amplitude output taper	Set upward and downward taper of the signal (1 ms to 10 ms)
Measurement start delay	Set delay time from signal output to start measurement (1 ms to 10 s)
Addition function (DS-0374)	Function that adds noise signal (for frequency response function measurement) to the feedback signal and outputs. * 1ch 100 kHz unit: It can be added for DS-0373 only.

Software specification

Measurement function (Servo analysis DS-0342)

FRA mode

Measurement frequency range	10 mHz to 40 kHz (40 kHz unit), 10 mHz to 100 kHz (100 kHz unit)	
Frequency resolution (Log sweep)	10, 20, 40, 50, 80, 100, 120, 160, 200, 250, 300, 320, 400, 500/decade	
Frequency resolution (Linear sweep)	100, 200, 400, 500, 800, 1000, 2000, 2500, 4000, 5000/entire band	
Number of averagings	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 25, 30, 40, 50, 60, 80, 100, 120, 150, 180, 200 times and arbitrary number of times	
Frequency range division setting mode	Measurement can be made by dividing the measurement frequency range into up to 10, changing the number of additions and the signal output level for each.	
Auto resolution control function	The function to automatically optimize the decade of each frequency band so that the characteristics of the entire frequency range can be observed with high accuracy.	

FFT mode

	40 kHz unit	100 kHz unit
Number of FFT sampling points	64, 128, 256, 512, 1024, 2048, 4096, 8192, 16384, (32768, 65536) points * Numbers in ( ) :only when signal output is random noise	
Frequency range (single range)	10, 20, 25, 40, 50, 80, 100, 160, 200, 400, 500, 800, 1k, 1.6k, 2k, 2.5k, 4k, 5k, 8k, 10k, 20k, 40k (Hz)	10, 20, 25, 40, 50, 80, 100, 160, 200, 400, 500, 800, 1k, 2k, 2.5k, 4k, 5k, 10k, 20k, 25k, 50k, 100k (Hz)
Frequency range (pair range)	Hi range: same as a single range Low range: 1/5, 1/10, 1/20, 1/50, 1/100 of Hi range	
Number of averagings	2, 5, 10, 40, 50, 60, 80, 100, 120, 150, 200, 250, 300, 400, 500, 600, 800, 1000, 1200, 1500, 1800, 2000 times and arbitrary number	
Calculation function	Frequency axis differential calculus function (first differential, second differential, single differential, double differential) Four arithmetic function	

Display function (Servo analysis function DS-0342)

Display of frequency response function	Co-quard graph (horizontal axis: frequency/vertical axis: real part and imaginary part)
	Bode graph (horizontal axis: frequency/vertical axis: gain and phase)
	Nyquist graph (horizontal axis: real part/vertical axis: polar display of imaginary part) (Logarithmic axis display of amplitude is available)
	Nicols graph (horizontal axis: phase/vertical axis: gain)
	Cole-cole plot
Display screen	Measurement screen (three screen display) 1) FRF (gain/phase), COH (ON/OFF of the display is available) 2) Either of Nyquist, Nicols or SPEC (1, 2ch) 3) TIME, instantaneous spectrum (Overlapping display and selecting channel are possible)
	List screen 1) List of all the measurement data of No./frequency/FRF gain/FRF phase/ COH/FRF real part/FRF imaginary part/SPEC1/SPEC2/Number of additions
	Peak List screen (Dual or Three screen display) 1) FRF (gain/phase), COH 2) Gain peak list (auto judgment) of 1) waveform 3) Add red point on the 1) screen by double-clicking the arbitrary position of 1) waveform and list the FRF (gain/phase) of it to the 3) screen. 4) Damping ratio list up function
	Memory screen 1) Current FRF 2) List of the stored waveform 3) Overlapping display of the waveform which selected in 2) (max. 20 screens)
	Calculation screen (four screen display) 1) Current FRF 2) Stored FRF 3) Waveform after four arithmetic operation/calculus of 1) and 2). Waveform after open and close loop conversion of 1) and 2). 　* Display of the waveform after calculation is available. 4) Nyquist graph and Nicols graph after the calculation results of 3).
Display function	Phase unwrap display, Search delta function

(Note) FRF: Frequency response function, COH: Coherence function, SPEC: Power spectrum, TIME: Time-axis waveform

Others (Servo analysis function DS-0342)

■-3 dB automatic search function ■Group delay ■Cross conversion function for open loop to close loop ■Automatic search function for gain margin and phase margin ■ Specific frequency resolution enlargement function (×20)

DS-3000 Series
Sound and Vibration Real-time Analysis System

■ Software

Model	Product name
DS-0321A	FFT Analysis
DS-0321L	FFT Analysis (off-line license)
DS-0322	Tracking Analysis
DS-0350	Recording Function (throughput disk function)
DS-0342	Servo Analyzer

Model	Product name
DS-0323	1 / 1 and 1 / 3 Real-time Octave Analysis
DS-0323L	1 / 1 and 1 / 3 Real-time Octave Analysis (off-line license)
DS-0324	1 / N Real-time Octave Analysis
DS-0325A	Tripartite Graph Function

■ Hardware

Model	Product name
DS-3200	Main Unit
DS-3202	40 kHz 2ch Main Unit
DS-3204	40 kHz 4ch Main Unit
DS-0362	2ch 40 kHz Input Unit (for expansion)
DS-0364	4ch 40 kHz Input Unit (for expansion)
DS-0371	1ch Signal Output Module for 40 kHz Unit (built-in)
DS-0372	2ch 40 kHz Signal Output Unit
DS-0366	2ch 100 kHz Frequency Band Input Unit
DS-0373	1ch 100 kHz Frequency Band Signal Output Unit

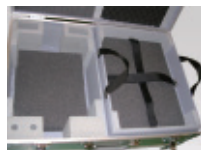| Model	Product name
DS-0374	Addition Function Option (built in the DS-0373)
DS-0392A	Unit Connection Interface (for DS-3200)
DS-0393	Unit Connection USB Hub (for FRAME LINK2)
DS-0394	Unit Connection Box (for FRAME LINK2)
AX-9035	Unit Connection Interface Cable (0.75 m)
AX-9036	Unit Connection Interface Cable (2 m, for FRAME LINK2)
AX-9041	USB Cable (2 m) with ferrite core
DS-0395	Remote Controller (cable length 2 m)

■ Hardware option

Soft carrying case CC-0025

Hard carrying case CC-0026
Inside dimensions of PC storage space: 273 × 335 × 55 mm

CC-0026 (inside)

Model	Product name
CC-0025	Soft Carrying Case (up to 3 units)
CC-0026	Hard Carrying Case (up to 3 units)
PS-P20023B	AC Adapter (up to 4 units)
PS-P20017D	Large AC Adapter (5 units or more)
-	Power Cable for adapter (2m)
PS-E10008G5.4	DC Input Power Cable (5.4 m, alligator clip with fuse)
	* Up to 4 units

■ Graph creation tool (OC-1300 series)

Model	Product name
OC-1340	OC-1300 Toolbox DAT・TRC browser pack
OC-0340	OC-1300 Toolbox DAT browser
OC-0341	OC-1300 Toolbox TRC browser
OC-1310	Basic
OC-1320	Standard
OC-1330	Professional

* Please refer to the OC-1300 Series brochure for details.

■ Time-series data analysis software (OS-2000 Series)

Model	Product name
OS-2500	Basic
OS-2600	Standard
OS-2700	Professional

* Please refer to the OS-2000 Series brochure for details.

■ Software for special analysis

Model	Product name
BF-3200	BF Monitor
BF-0310	BF Offline Analysis (Time-series Data Analysis Tool OS-2000 is required.)
DS-0225A	3D Sound Intensity Analysis Software
DS-0231A	Sound Power Measurement Software
DS-0227A	Field Balancing Software
GN-1100	Noise Testing Software
GN-0100	ORF Input & Recalculation Function
GN-0110	Secondary Data Processing Function
GN-0120	GN link function / External communication function
GN-0140	Dual Rev Tracking Function
GN-0150	Calculation Rev Tracking Function
GN-0160	Dent Analysis Function

■ Operating Environment

Interface: **[DS-3200]** **USB 3.0 should be installed, and has two or more of USB port (communication and license key).**
Supports USB 2.0 and USB 3.0.
(Data transmission using USB 2.0 is slower than using USB 3.0)

OS: **Required to be equipped with any one of the following OS (Operating System)**
Microsoft® Windows® 10 Pro/Enterprise/Education (64-bit)
Microsoft® Windows® 7 Ultimate / Professional (32-bit / 64-bit)

Recommended specifications: **CPU: Intel® Core™ i5 or more, memory: 4 GB**
When FFT-A mode of the FFT analysis function (DS-0321A) is used, CPU: Intel® Core™ i7 or more, memory: 8 GB, OS: 64-bit

* Some application software may not be applicable to the above operating environment. For more details, please contact your nearest distributor or send an e-mail to us **(overseas@onosokki.co.jp)**.
* Please note that the DS-3000 Series does not work normally when the OS other than the above is used by using compatible mode or Microsoft® Virtual PC etc.
* The PC environment may be subject to certain constraints, depending on the type of application software or hardware used. For more details, please contact your nearest distributor or send an e-mail to us **(overseas@onosokki.co.jp)**.
* The DS-3000 Series operates on Windows® 7 64-bit ver. by means of a compatibility mode with 32-bit ver. (WOW64).
* When using in FFT-A mode / 64 channels or more system, select the PC with CPU performance higher than Intel® Core™ i7-7500U processor.

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