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

- Supports USB 3.0

Multi-Channel Data Station

Software

Hardware

Multi-Channel Data Station

DS Series

ONOSOKKI
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**
---|---|---
**HARDWARE**

**Easy-to-use**

**SOFTWARE**

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

**Data recording**

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)**

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.

**Real-time Octave Analysis**

“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.

**Rotational Tracking Analysis**

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.
**Feature. 1 Speedy**

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

Supporting up to 64 ch of data recording at 20 kHz range (audio frequency band). You can use a USB cable on the market when connecting to a PC. Both USB 3.0 and USB 2.0 are available, and automatically distinguished which one is connected, and is indicated on the front panel.

LED color tells the type of the connecting 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. You can change various measurement conditions easily while you watch the measurement screen in real time. To support speedy and smooth measurement on site, commonly-used measurement 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.

**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 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
Making best suited setup for on-site measurement

During the measurement, it is necessary to alter the measuring conditions at the site due to unexpected situations including occurrence of noise (environmental noise, 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 x N) with a mouse.
- Up to 128 screens can be displayed in one window.
- Up to 10 windows can be displayed.

**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.
Scheduled measurement setting

- Frequency calculus setting

Main 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.
- Easy to set the number of graph screens (M × N) with a mouse.
- Up to 128 screens can be displayed in one window.
- Graph layout selection button

Setup dialogue box

- 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.

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.

Option bar

- 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.

Data saving window

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

Setup dialogue box

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

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 1: 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).

**Connection example**

**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

**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 ② 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 ① Data recording of unexpected abnormal vibration and sound automatically**

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
  - Microphone

- **Sound measurement of electric component**
  - Soundproof box
  - Microphone

**Application ② Repeat measurement automatically 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**

**Function ③ 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.

**Previous method**

Input of setting values is required to expand the axis and adjust the scale.

- **Easy operation only with mouse**
  - 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
DS-0325A Tripartite graph function

Three amplitude values (acceleration: m/s², 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/s²), 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...

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

Previous method
You had to operate differential and integral calculus from the data which you measured.

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 when you click the button!

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

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

Hardware
DS Series
Multi-Channel Data Station
Various functions

Enhanced saving function
Common setting function for multiple selections

* Up to 40 GB of consecutive ORF files can be displayed.
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.

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.
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GOOD

Three amplitudes (velocity, acceleration, and displacement) can be read out in a single graph. You had to operate differential and integral calculus from the data which you measured.

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<table>
<thead>
<tr>
<th>Acceleration (m/s²)</th>
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<th>Displacement (m)</th>
<th>Displacement (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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● DS-3000 Series
● OS-2000 Series
Saves multiple data after recording and analyzing.

You can immediately compare the recorded data and analyze in detail!

【Advantages】

● You can automatically export the recorded files to the OS-2000 Series when you click the button!

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.

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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.
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Measuring sound
FFT analysis and octave analysis of sound

**[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

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[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 analysis enables the analysis and trend measurement with time-weighting (Fast, Slow, etc) equivalent to that of sound level meters.

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[What is Tracking analysis?]
Rotation-tracking analysis greatly help to observe the cause which component or which order of rotation speed makes noise and vibration when a rotating machine makes vibration with certain rotation speed.

As shown in the right figure, rotation-spectrum diagram (3D spectrum) figures out the change of frequency (order) spectrum respect to the change of rotation speed. In comparison, rotation-tracking analysis (order tracking analysis) shows that how much noise and vibration are generated from which order of rotation component with two-dimensional graph.

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**System configuration**

1/2-inch Measurement Microphone
Microphone Preamplifier
Sound Level Meter
DS-3000 Series hardware
Notebook PC

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**Analysis Examples**

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.

1/6 real-time octave analysis
Color mapping display
Overlay display

1/3 real-time octave analysis

*DS-0324 is required.
Rotation tracking analysis

Rotation tracking analysis of noise and vibration

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.

* The range of rotation number at 1 P/R.

[What is Tracking analysis?]

Rotating machines such as engines or compressors etc. are rotating with wide range of rotation speed from low to high speed. For those rotating machines, resonance between rotation speed and natural frequency of each component (rotation shaft, gear, bracket etc.) of rotating machine may cause serious problem. Torsional vibration generated by a large generator as an example, resonance may generate excitation energy larger than allowable stress, and therefore it may cause a serious accident to destruction.

Rotation-tracking analysis greatly help to observe the cause which component or which order of rotation speed makes noise and vibration when a rotating machine makes vibration with certain rotation speed.

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Color mapping display

3D array display
### Measurement of frequency response function

**Measurement of natural frequency / damping ratio**

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 acceleration sensor.

![Image of measurement setup](image)

**System configuration**

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

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), acceleration or invariance) 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.

### Vibration measurement in a range of ultrasonic

**Vibration measurement in a range of ultrasonic using a Laser Doppler Vibrometer**

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.

![Image of measurement setup](image)

**System configuration**

- Sensor head
- Laser Doppler Vibrometer
- DS-3000 Series hardware (100 kHz unit)
- Notebook PC
- DS-0321A
- FFT

Detection frequency range: 0.3 to 3 MHz (fc=-3 dB)

Maximum detection velocity: 10 m/s (20 m/s p-p)

Minimum velocity resolution: 0.3 µm/s or less (when at 0.01 (m/s) /V)

Conforming standards:

- FDA 21CFR Part1040.10 (CDR H)
- IEC60825-1: 2007 class 2
- JIS C 6802 class 2
Visualization of sound in closing door of a vehicle

Sounds and vibrations that occur when closing the 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.

Sound pressure map of a vending machine

Multi-channel measurement using FRAME LINK2 enables to measure the sound and vibration for 40 points at once, greatly improve work efficiency. It is not necessary to measure many times while changing measurement points.
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.

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 for when high accuracy measurement with dynamic range are required.
  - *Example: FRA mode (Measurement time: 100 seconds) Log Sin sweep excitation*

- **FFT mode**
  - Gain and phase can be obtained with high speed. Used for the measurement when short time processing of wide band is required.
  - *Example: FFT mode (Measurement time: 3 seconds) Random excitation*

Servo & sound / vibration analysis

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 hand shaking correction control characteristics of camera and servo analysis of mechanical control characteristics can be easily switched.

Useful functions

- **Auto resolution control function**
  - This is a function that increases the frequency resolution near a sharp peak automatically. You can increase the resolution in short time only for the specified area. 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.

7 Measurement of resonance frequency using an exciter

Excitation control measurement of electrical equipment substrate using the laser Doppler vibrometer

This example shows the frequency characteristic measurement of electrical parts embedded in the electronic substrate.

The DS-3000 series controls exciting 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 excitation mode, target value, allowable value.
- Display the target value.

Power spectrum

- Frequency response function
  - Velocity/Laser Doppler Vibrometer/Acceleration/Accelerometer
  - Resonance point

System configuration

- Measurement object: Electronic equipment substrate
- Exciter
- Amplifier for exciter
- DS-3000 series hardware (100 kHz unit)

Control signal + disturbance signal

- Microphone preamplifier
- ISAC (A-weighting)
- Frequency range
  - -60 Hz to +180 Hz
  - -40 Hz to +180 Hz
  - -30 Hz to +180 Hz
  - -10 Hz to +180 Hz
  - 10 Hz to +180 Hz

-10 dB
-20 dB
-40 dB
-60 dB

Hardware

- Notebook PC
- DS-0342
- Servo

Software

- Servo Analyzer (DS-0342)
- Frequency Characteristics Analyzer

Increased in performance

- Measurement object: Digital camera
- Motor sound/Hand shaking correction control characteristics

Increased in performance

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

- Measurement object: Sound/Vibration measurement (FFT Analysis)
- Mechanical control characteristics measurement (Servo analysis)

- Measurement object: Excitation control measurement (DS-0321A)
-60 dB
-40 dB
-20 dB
-0 dB
+20 dB
+40 dB
+60 dB
+80 dB

Display the allowable value of set operation, target value, and reference value selected with the cursor.
Measurement of control characteristics (gain margin, phase margin)

Motors incorporated in various products such as industrial equipment and automobiles have control circuits (closed loop circuit) for controlling rotational 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 easily and highly accurately.

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.

Measurement of acoustic frequency characteristics

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)

Microphone (MI-1271)

- Sensitivity: -26 dB ± 1.5 dB re. 1V/Pa
- Frequency range: 1 Hz to 20 kHz (+ 2 dB)
- Inherent noise level (A-weighting): 14.0 dB

* 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).
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**

<table>
<thead>
<tr>
<th>DAT Browser</th>
<th>TRC Browser</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time-axis waveform, power spectrum, bundled octave, Fourier spectrum, Tracking diagram, Frequency response function (Real, Imag, Mag, Phase), coherence, tracking diagram, time (1/1, 1/3)</td>
<td>Constant width (time, rotation), Constant ratio (time, rotation), octave (1/1, 1/3 (time, rotation))</td>
</tr>
</tbody>
</table>

**DAT Browser OC-0340**
DAT Browser can read up to 100 FFT data (DAT, TLD) 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.

**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 etc. Multiple tracking data files are imported and created as graphs in several windows.

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.

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.

*gbl (GRAPHTEC corporation), iedit (TEAC Corporation), mem (HIOKI E.E. CORPORATION), wdf (Yokogawa Electric Corporation)
With wide variety of sensors, analyzers, and software, ONO SOKKI provides total solution on sound, vibration, and rotation measurement.
**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).

**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

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

<table>
<thead>
<tr>
<th>Model name</th>
<th>DS-0392A (for DS-3200)</th>
</tr>
</thead>
</table>
| Connection cable | AX-9036 cable length 0.15 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-0342). Servo analysis (DS-0343) are not supported. |

### Unit connection box (DS-0394) (option)

<table>
<thead>
<tr>
<th>Model name</th>
<th>DS-0394A (for DS-3200 with DS-0392A installed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable connection cable</td>
<td>AX-9036 or AX-9036</td>
</tr>
<tr>
<td>Connector shape</td>
<td>26 pin exclusive connector</td>
</tr>
<tr>
<td>Power supply / power consumption</td>
<td>Supplied from the DS-3000 connected to the UNIT 1 connector / 1.2 W or less</td>
</tr>
<tr>
<td>Outer dimensions</td>
<td>168 (W) × 23 (H) × 100 (D) mm (not including protruded section)</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 450 g</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>0 to 40 °C (with no condensation)</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-10 to 60 °C (with no condensation)</td>
</tr>
<tr>
<td>Applicable standard</td>
<td>Cet marking</td>
</tr>
</tbody>
</table>

### Unit connection USB HUB DS-0393 (option)

| Connector | USB 3.0 (Type A) × 4, USB 3.0 (Type B) × 1 |
| Power supply / power consumption | 5V 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 | Cet marking |

### Outer dimensions

| Model name | DS-3200, DS-3400 (100 kHz units)  
DS-3200, DS-3400, DS-3500 (40 kHz units) |
|------------|---------------------------------|
| Measurement channel | 4ch system  
8ch system  
16ch system  
32ch system |
| Applicable software | FFT Analysis (DS-0321A), Tracking Analysis (DS-0322),  
Recording function (DS-0350)  
* Real-time octave analysis (DS-0342). Servo analysis (DS-0343) are not supported. |

### Notes on hardware specification

- **40 kHz unit and 40 kHz unit cannot be used together.**
- **The max. number of units for 100 kHz [DS-3200 + (DS-3066 × 2) + (DS-0373 × 2)] (input 4ch, output 2ch)**
- The DS-3071 is built in a main unit.
- The DS-0371 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.)
- The DS-3200 USB 3.0 interface cannot be used with a USB hub. USB protection key can be used with a USB hub.

### 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-9036 (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.**
## 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

<table>
<thead>
<tr>
<th>Model</th>
<th>DS-3200 (DS-3200 + DS-0364) / DS-3204 (DS-3200 + DS-0366)</th>
<th>DS-3200 + DS-0366</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>DC to 40 kHz</td>
<td>DC to 100 kHz</td>
</tr>
<tr>
<td>Number of processing channels</td>
<td>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)</td>
<td>2ch to 4ch (Unit connection function: not available)</td>
</tr>
<tr>
<td>External input</td>
<td>Voltage range ±12 V, 0 to 300 kHz (with out of band filter)</td>
<td>Detection level -12 V to +12 V (0.025 V step) / + (rising) or - (falling) 0.5 to 1024 PPR, 1 to 1024 with frequency dividing function. When inputting rotation pulse (in the case of 1 PPR), range of detectable rotation speed: 60 to 192,000 rpm or 80 to 240,000 rpm</td>
</tr>
<tr>
<td>External trigger input</td>
<td>Voltage range ±12 V, 0 to 300 kHz (with out of band filter)</td>
<td>-12 V to +12 V (0.025 V step) / + (rising) or - (falling) Repeat, single, one-shot: depending on software</td>
</tr>
<tr>
<td>Monitor output</td>
<td>Input signal which is standardized by voltage range is outputted from the terminal on the rear panel of the input unit. (1 V rms max.) Monitor signal after filtered is output when sound filter is used.</td>
<td></td>
</tr>
<tr>
<td>Terminal for monitor output</td>
<td>6.35 mono-socket jack</td>
<td>6.35 monaural-mini jack</td>
</tr>
<tr>
<td>PC interface</td>
<td>[DS-3200] USB 3.0 interface is built-in.</td>
<td></td>
</tr>
<tr>
<td>Accessory</td>
<td>Instruction manual, AC adapter, power cable for AC adapter, USB 3.0 cable (2 m, with ferrite core)</td>
<td></td>
</tr>
</tbody>
</table>

### Common specification of units

| Power voltage / power consumption | 100 to 240 VAC, 10.5 to 16.5 VDC / 25 to 95 VAC (when 15 VDC) | 100 to 240 VAC, 10.5 to 16.5 VDC / 25 to 55 VAC (when 15 VDC) |
| Outer dimensions | 269 (W) x 71 to 267 (H) x 217 (D) mm (including protruded section) | 369 (W) x 71 to 155 (H) x 217 (D) mm (including protruded section) |
| Weight | Approx. 4.0 kg (4ch system: 2 units) to 8.8 kg (32ch system: 9 units) | Approx. 2.2 kg (2ch system: 2 units) to 4.4 kg (input 4ch + output 2ch system: 5 units) |
| Cooling fan | Required for a system of 5 units or greater. | Required for a system of 4 units or greater. |
| Operating temperature range | -10 to +60 °C (with no condensation) | |
| Storage temperature range | -25 to +80 °C (with no condensation) | |
| Applicable standard | CE marking | |

### AC adapter specification (compatible to 40kHz and 100kHz unit)

| 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 / GB / PSE | |

### Input unit

<table>
<thead>
<tr>
<th>Model</th>
<th>DS-0362 / DS-0364 / DS-0366</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of input channels</td>
<td>2ch / 4ch</td>
</tr>
<tr>
<td>Input terminal</td>
<td>BNC</td>
</tr>
<tr>
<td>Input impedance</td>
<td>1 MΩ ±5% / 100 pF or less</td>
</tr>
<tr>
<td>Input coupling</td>
<td>DC or AC (-3 dB at 1.55 kHz)</td>
</tr>
<tr>
<td>Isolation</td>
<td>Non-insulation / Insulated (provided as standard)</td>
</tr>
<tr>
<td>Power supply for sensor (CCU)</td>
<td>Electric current is supplied to a constant current supply-type sensor through an input connector (BNC) +24 V / 4 mA</td>
</tr>
<tr>
<td>TEDS function</td>
<td>Supports TEDS: IEEE 1451.4 Ver.0.9, Ver.1.0; accelerometer and microphone, IEEE 1451.4 Ver.1.0 force sensor</td>
</tr>
<tr>
<td>Sound filter</td>
<td>A and C weighting (provided as standard)</td>
</tr>
<tr>
<td>Input voltage range</td>
<td>10 mVrms to 10 Vrms (7-range, 10 dB step)</td>
</tr>
<tr>
<td>Accuracy of input level monitor</td>
<td>Excessive voltage input turns on the red LED (Lights when the voltage is 95% or more of full scale range.)</td>
</tr>
<tr>
<td>A/D converter</td>
<td>24 bits Type 2Д8</td>
</tr>
<tr>
<td>Accuracy between channels</td>
<td>Within ±0.03 dB, within ±0.4 deg (0 to 20 kHz)</td>
</tr>
<tr>
<td>Dynamic range</td>
<td>110 dB (40 kHz range, 1 Vrms range, when analyzed at 256 points)</td>
</tr>
<tr>
<td>Outer dimensions</td>
<td>271 (W) x 28 (H) x 217 (D) mm (including protruded section)</td>
</tr>
<tr>
<td>Weight</td>
<td>900 g or less</td>
</tr>
</tbody>
</table>
Signal output: DS-0371 / DS-0372 / DS-0373 (option)

<table>
<thead>
<tr>
<th>Model</th>
<th>40 kHz unit</th>
<th>100 kHz unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of output channels</td>
<td>1ch / 2ch</td>
<td>1ch</td>
</tr>
<tr>
<td>Output terminal</td>
<td>BNC</td>
<td></td>
</tr>
<tr>
<td>Output impedance</td>
<td>50 kΩ or 10 kΩ</td>
<td>&lt;1 Vrms or 10 V</td>
</tr>
<tr>
<td>A/D converter</td>
<td>16 bits Type ⊿Σ</td>
<td></td>
</tr>
<tr>
<td>Isolation</td>
<td>Insulated between each channel (Permanently)</td>
<td></td>
</tr>
<tr>
<td>Output voltage amplitude</td>
<td>±10 mV to ±10 V</td>
<td>±1 mV to ±10 V</td>
</tr>
<tr>
<td>Offset voltage</td>
<td>±10 V</td>
<td></td>
</tr>
<tr>
<td>Maximum output current</td>
<td>10 mA</td>
<td></td>
</tr>
<tr>
<td>Frequency range</td>
<td>DC to 40 kHz</td>
<td>DC to 100 kHz</td>
</tr>
<tr>
<td>Output waveform</td>
<td>Sine wave, swept sine, random (decorrelation between channels), pseudo random, impulse, octave band noise, pink noise, recorded data (ORF format)</td>
<td></td>
</tr>
<tr>
<td>Outer dimensions (unit)</td>
<td>271 (W) × 28 (H) × 217 (D) mm (including protruded section)</td>
<td></td>
</tr>
<tr>
<td>Weight (unit)</td>
<td>900 g or less</td>
<td></td>
</tr>
</tbody>
</table>

Addition function: DS-0374

<table>
<thead>
<tr>
<th>Model</th>
<th>100 kHz unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of input channels</td>
<td>1ch</td>
</tr>
<tr>
<td>Input terminal</td>
<td>BNC</td>
</tr>
<tr>
<td>Input impedance</td>
<td>1 MΩ ±0.5 % or 100 pF or less</td>
</tr>
<tr>
<td>Input voltage range</td>
<td>±10 V</td>
</tr>
<tr>
<td>Isolation</td>
<td>Insulated (Permanently)</td>
</tr>
<tr>
<td>Function</td>
<td>The function which inputs disturbance noise and outputs it after the addition to the preset signal</td>
</tr>
</tbody>
</table>

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)] (including a main unit).
- The DS-0373 cannot be added to a 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. 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-3000 USB 3.0 Interface cannot be used with a USB hub, USB protection key can be used with a USB hub.
- If you would 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 (oversea@nosokoki.co.jp).

Outer dimensions:

Front view:

- [40 kHz] 4ch system: 271 mm x 70 mm x 217 mm
- 8ch system: 271 mm x 140 mm x 217 mm
- 16ch system: 271 mm x 280 mm x 217 mm
- 32ch system: 271 mm x 280 mm x 217 mm

Rear view:

- 2ch input system: 271 mm x 70 mm x 104 mm
- 2ch input and 1 ch output system: 271 mm x 70 mm x 104 mm

Side view:
## Software specification

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

### Shifting or operating application software

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFT analysis</td>
<td>DS-0321A/DS-0321B (3D array display (monochrome / color), color mapping display, Campbell plot) Designated order 8 lines + MaxORD + OA + POA per 1 screen can be plotted.</td>
</tr>
<tr>
<td>Tracking analysis</td>
<td>Starting or operating application software can be accomplished.</td>
</tr>
<tr>
<td>Switching (with active software)</td>
<td>On-line analysis of the DS-3000 hardware. Off-line analysis: Analyzes recorded time sampling data.</td>
</tr>
<tr>
<td>Operation of the measurement window</td>
<td>Up to 128 screens / 1 window, to a new file to record.</td>
</tr>
<tr>
<td>FFT analysis function</td>
<td>ORF file (Ono Sokki Original Format): rotation information recording available</td>
</tr>
</tbody>
</table>

### Calculation function

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFT analysis (DS-0321A/DS-0321B)</td>
<td>FFT analysis (DS-0321A/DS-0321B)</td>
</tr>
<tr>
<td>FFT mode</td>
<td>FFT mode (DS-0321A/DS-0321B)</td>
</tr>
</tbody>
</table>

## Tracking analysis function

### Tracking analysis types

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amplitude tracking, phase tracking</td>
<td>Amplitude tracking, phase tracking</td>
</tr>
</tbody>
</table>

### Tracking analysis specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampling method</td>
<td>Constant rate tracking (external sampling); up to maximum analysis orders</td>
</tr>
<tr>
<td>Number of FFT analysis points</td>
<td>64 to 16384 points (power of two)</td>
</tr>
<tr>
<td>Frequency response</td>
<td>Time-avg summation averaging; time-avg exponential averaging, power spectrum summation averaging, power spectrum exponential averaging, etc.</td>
</tr>
<tr>
<td>Analysis frequency</td>
<td>Power spectrum, Fourier spectrum, filtered spectrum, cross spectrum, frequency response function (FRF), coherent function, coherence output power</td>
</tr>
<tr>
<td>Analysis function</td>
<td>Mean value, absolute mean value, rms value, standard deviation, maximum value, minimum value, form factor, crest factor, skewness, kurtosis</td>
</tr>
<tr>
<td>Analysis display</td>
<td>Up to 128 screens / 1 window (overlapping display in a window), up to 10 windows / up to 64 screens</td>
</tr>
<tr>
<td>Cursor function</td>
<td>Scanning cursor, peak cursor, delta cursor</td>
</tr>
</tbody>
</table>

### Calculation function

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-spectrum, h-spectrum, total harmonics, distortion list, arbitrary list, all list</td>
<td></td>
</tr>
<tr>
<td>Complex transfer function, frequency calculation, filter transform, spinning and closing loop calculation, damping ratio calculation, FRF reciprocal calculation, four arithmetic operation</td>
<td></td>
</tr>
</tbody>
</table>

## Tracking analysis function

### Tracking analysis types

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amplitude tracking, phase tracking</td>
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</tr>
</tbody>
</table>

### Tracking analysis specifications

<table>
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<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampling method</td>
<td>Constant rate tracking (external sampling); up to maximum analysis orders</td>
</tr>
<tr>
<td>Number of FFT analysis points</td>
<td>64 to 16384 points (power of two)</td>
</tr>
<tr>
<td>Frequency response</td>
<td>Time-avg summation averaging; time-avg exponential averaging, power spectrum summation averaging, power spectrum exponential averaging, etc.</td>
</tr>
<tr>
<td>Analysis frequency</td>
<td>Power spectrum, Fourier spectrum, filtered spectrum, cross spectrum, frequency response function (FRF), coherent function, coherence output power</td>
</tr>
<tr>
<td>Analysis function</td>
<td>Mean value, absolute mean value, mean value, standard deviation, maximum value, minimum value, form factor, crest factor, skewness, kurtosis</td>
</tr>
<tr>
<td>Analysis display</td>
<td>Up to 128 screens / 1 window (overlapping display in a window), up to 10 windows / up to 64 screens</td>
</tr>
<tr>
<td>Cursor function</td>
<td>Scanning cursor, peak cursor, delta cursor</td>
</tr>
</tbody>
</table>

### Calculation function

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-spectrum, h-spectrum, total harmonics, distortion list, arbitrary list, all list</td>
<td></td>
</tr>
<tr>
<td>Complex transfer function, frequency calculation, filter transform, spinning and closing loop calculation, damping ratio calculation, FRF reciprocal calculation, four arithmetic operation</td>
<td></td>
</tr>
</tbody>
</table>

## Recording function

### Recording function (Through disk function)

The digital signals after AD conversion of the analog signal can be continuously recorded to the hard disk of the personal computer. Recording available in the recording mode.

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFT analysis</td>
<td>FFT analysis of DS-0321A/DS-0321B. Tracking analysis (DS-0322). FTA analysis (DS-0322). Recording function (through disk function) (DS-0322). Software functions can be operated with FTT (excluding constant ratio tracking) or RTA analysis.</td>
</tr>
<tr>
<td>File format (only storing)</td>
<td>REC file (Ono Sokki Original Format): rotation information recording available</td>
</tr>
<tr>
<td>Continuous recording</td>
<td>Even after reaching the limit of the recording capacity of CRF file (4 G), continuous recording without data missing is available by switching the save destination to a new file to record.</td>
</tr>
</tbody>
</table>

### Calculation function

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>File export function</td>
<td>FTFX format, WFX format</td>
</tr>
</tbody>
</table>
**DS Series Multi-Channel Data Station**

**Measurement unit:**
- 40 kHz unit: 2 to 32ch
- 100 kHz unit: 2 to 4ch

**Number of measurement channels:**
- 2 to 32ch: DS-3202, DS-3204, DS-3102, DS-3104
- 2 to 4ch: DS-3200+DS-3066, DS-3100+DS-3066

**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 (FFT mode, 100 kHz unit)
- 90 dB (FFT mode, 40 kHz unit)

**Signal output function:**
- Servo analysis system
- Signal output function is required for servo analysis system.

**Output function:**
- DS-3071 module/DS-3072 unit (40 kHz), DS-3073 unit (100 kHz)

**Number of output channels:**
- 1ch

**Type of output signal:**
- Sine sweep (log/linear), Sweep 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 regulator:**
- 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 s)

**Measurement start delay:**
- Set delay time from signal output to start measurement (1 ms to 10 s)

**Addition function:**
- Function that adds noise signal (for frequency response function measurement) to the feedback signal and outputs
- 1 ch 100 kHz unit: It can be added for DS-3073 only.

**Software specification**

**Measurement function (Servo analysis system DS-3042)**

**FRA mode:**
- 10 MHz to 40 kHz (40 kHz unit), 10 MHz to 100 kHz (100 kHz unit)
- 10, 20, 40, 50, 80, 100, 120, 160, 250, 500, 1000, 2000 kHz
- 2 ch, 4 ch, 8 ch, 16 ch, 32 ch, 64 ch

**FFT mode:**
- 10, 20, 25, 40, 50, 80, 100, 160, 200, 400, 500, 800, 1 kHz, 2 kHz, 2.5 kHz, 4 kHz, 5 kHz, 10 kHz
- 20, 25, 30, 40, 50, 60, 80, 100, 120, 150, 180, 200 kHz

**Number of averages:**
- 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 up to 10, changing the number of additions and the signal output level for each.

**Auto resonance 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**

**Number of FFT sampling points:**
- 64, 128, 256, 512, 1024, 2048, 4096, 8192, 16384, (32768, 65536) points
- *Numbers in ( ) are when signal output is only random noise

**Frequency range (single range):**
- 10, 20, 25, 40, 50, 80, 100, 160, 200, 400, 500, 800, 1 kHz, 2 kHz, 2.5 kHz, 4 kHz, 5 kHz, 10 kHz, 20 kHz, 25 kHz, 50 kHz, 100 kHz

**Number of averages:**
- 2, 5, 10, 40, 50, 60, 80, 100, 120, 150, 160, 200, 250, 300, 400, 500 kHz

**Calculation function:**
- Frequency differential calculus function (first differential, second differential, single differential, double differential)
- Four arithmetic function

**Display function (Servo analysis function DS-3042)**

**Display of frequency response function:**
- Co-ordinate graph (horizontal axis: frequency, vertical axis: real part and imaginary part)
- Mode 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)
- Nichols 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 Nyquist, Nichols or SPEC (1, 2ch)
  3) TIME, instantaneous spectrum (Overlapping display of selecting channel is available)
- 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
  2) Peak List screen (Dual or Three screen display)
  3) Gain peak list (auto judgment) of 1 waveform
  4) 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.
  5) Damping ratio list up function
- Calculation screen (four screen display)
  1) Current FRF
  2) List of the stored waveform
  3) Overlapping display of the waveform which selected in 2) (max. 20 screens)

**Analysis function:**
- 1 ch 100 kHz unit: It can be added for DS-3073 only.

**Others (Servo analysis function DS-3042):**
- 1 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 dB)
## Hardware

<table>
<thead>
<tr>
<th>Model</th>
<th>Product name</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS-3000</td>
<td>Main Unit</td>
</tr>
<tr>
<td>DS-3202</td>
<td>40 kHz 2ch Main Unit</td>
</tr>
<tr>
<td>DS-3204</td>
<td>40 kHz 4ch Main Unit</td>
</tr>
<tr>
<td>DS-0362</td>
<td>2ch 40 kHz Input Unit (for expansion)</td>
</tr>
<tr>
<td>DS-0364</td>
<td>4ch 40 kHz Input Unit (for expansion)</td>
</tr>
<tr>
<td>DS-0371</td>
<td>1ch Signal Output Module for 40 kHz Unit (built-in)</td>
</tr>
<tr>
<td>DS-0372</td>
<td>2ch 40 kHz Signal Output Unit</td>
</tr>
<tr>
<td>DS-0366</td>
<td>2ch 100 kHz Frequency Band Input Unit</td>
</tr>
<tr>
<td>DS-0313</td>
<td>1ch 100 kHz Frequency Band Signal Output Unit</td>
</tr>
</tbody>
</table>

## Hardware option

<table>
<thead>
<tr>
<th>Model</th>
<th>Product name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC-0025</td>
<td>Soft Carrying Case (up to 3 units)</td>
</tr>
<tr>
<td>CC-0026</td>
<td>Hard Carrying Case (up to 3 units)</td>
</tr>
<tr>
<td>PS-P20023A</td>
<td>AC Adapter (up to 4 units)</td>
</tr>
</tbody>
</table>

## Software for special analysis

<table>
<thead>
<tr>
<th>Model</th>
<th>Product name</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS-0227A</td>
<td>3D Sound Intensity Analysis Software</td>
</tr>
<tr>
<td>DS-0227H</td>
<td>Field Balancing Software</td>
</tr>
</tbody>
</table>

## Software

<table>
<thead>
<tr>
<th>Model</th>
<th>Product name</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS-0321A</td>
<td>FFT Analysis</td>
</tr>
<tr>
<td>DS-0321L</td>
<td>FFT Analysis (off-line license)</td>
</tr>
<tr>
<td>DS-0322</td>
<td>Tracking Analysis</td>
</tr>
<tr>
<td>DS-0330</td>
<td>Recording Function (throughput disk function)</td>
</tr>
<tr>
<td>DS-0342</td>
<td>Servo Analyzer</td>
</tr>
<tr>
<td>DS-0323</td>
<td>1 / 1 and 1 / 3 Real-time Octave Analysis</td>
</tr>
<tr>
<td>DS-0323L</td>
<td>1 / 1 and 1 / 3 Real-time Octave Analysis (off-line license)</td>
</tr>
<tr>
<td>DS-0324</td>
<td>1 / N Real-time Octave Analysis</td>
</tr>
<tr>
<td>DS-0325A</td>
<td>Tripartite Graph Function</td>
</tr>
<tr>
<td>DS-0374</td>
<td>Addition Function Option (built in the DS-0373)</td>
</tr>
<tr>
<td>DS-0392A</td>
<td>Unit Connection Interface (for DS-3200)</td>
</tr>
<tr>
<td>DS-0393</td>
<td>Unit Connection USB Hub (for FRAME LINK2)</td>
</tr>
<tr>
<td>DS-0394</td>
<td>Unit Connection Box (for FRAME LINK2)</td>
</tr>
<tr>
<td>AX-9035</td>
<td>Unit Connection Interface Cable (0.75 m)</td>
</tr>
<tr>
<td>AX-9036</td>
<td>Unit Connection Interface Cable (2 m, for FRAME LINK2)</td>
</tr>
<tr>
<td>AX-9041</td>
<td>USB Cable (2 m) with ferrite core</td>
</tr>
<tr>
<td>DS-0396</td>
<td>Remote Controller (cable length 2 m)</td>
</tr>
</tbody>
</table>

## 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 (64-bit)
  - Microsoft® Windows® 7 Ultimate / Professional (32-bit / 64-bit)

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