ONO SOKKI

DS-2000 Series

Vibration Measurement

ONO SOKKI CO., LTD.

Contents

1. Flow Chart to Measurement

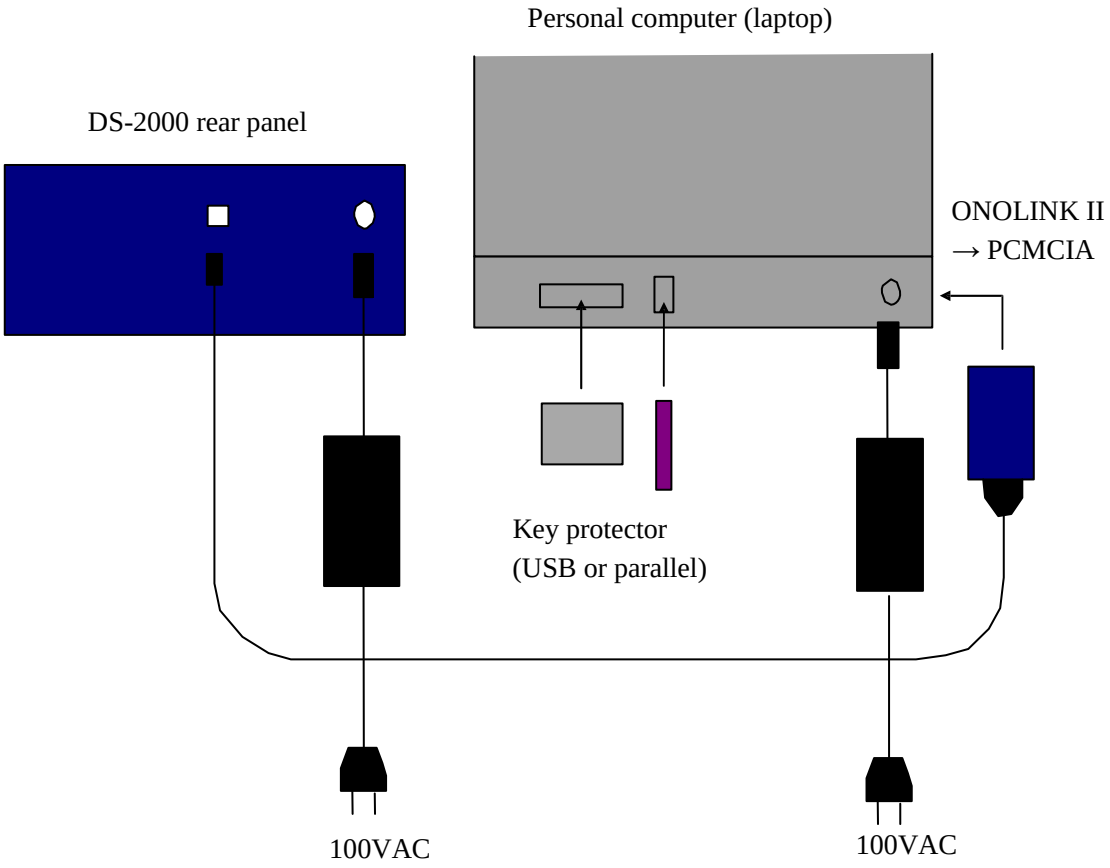
* The following explains procedures for measuring vibration using an "accelerometer."

Accelerometer connection	**Connect an accelerometer to the DS-2000.**
↓	
Input source setup **Engineering unit setup**	**Set the type and output sensitivity of the connected sensor.**
↓	
Voltage range setup **Frequency range setup** **Frequency differential/integral**	**Set the voltage sensitivity, frequency range, Y-axis scale, and frequency differential/integral.**
↓	
Data processing (averaging) **Saving data** **Copy data**	**Process data (averaging) and then save it. Then, copy data and then paste it to other applications.**

2. Device Connections

2-1 Device Connections

Connect the DS main unit and the PC as follows.



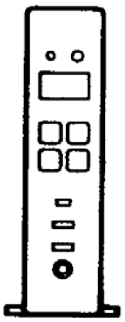
2-2 Connection with Sensor

Connect an "accelerometer" to the FFT analyzer. The accelerometer comes in two types: built-in amplifier type and charge output type. Basically, connect each sensor with the DS-2000 as follows:

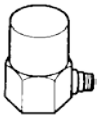
The NP-3000 series accelerometer can be directly input through a BNC conversion adapter.

Signal input section

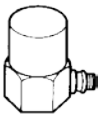
NP-0021 BNC conversion adapter



CH-1100
Charge amplifier



NP-3000 Series
Accelerometer



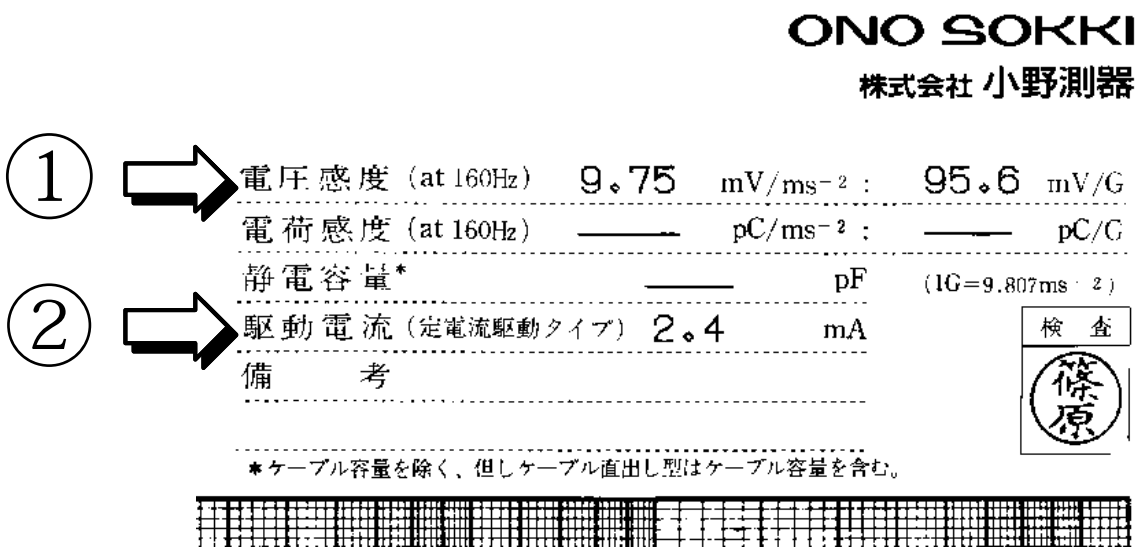
NP-2000 Series
Accelerometer

Install the accelerometer perpendicularly to the vibration direction by closely contacting the bottom of the accelerometer and the measurement surface. Fixation by screw provides the highest frequency sensitivity. When using a magnet base, the use of silicon grease increases adhesion.

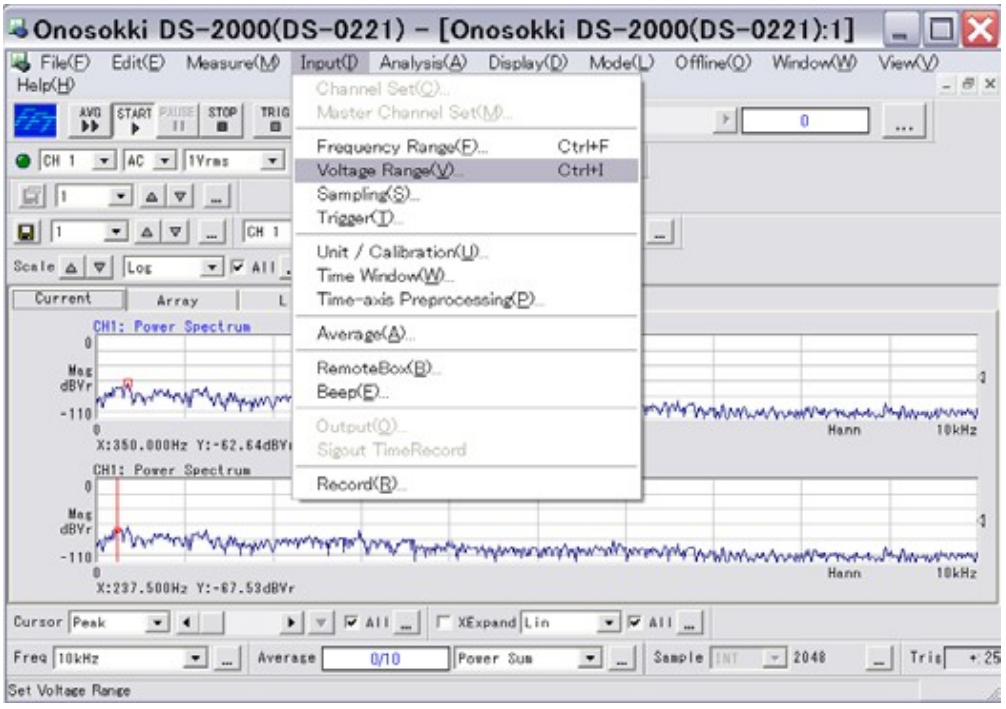
3. FFT Analyzer Setup

3-1 Input Source Setup

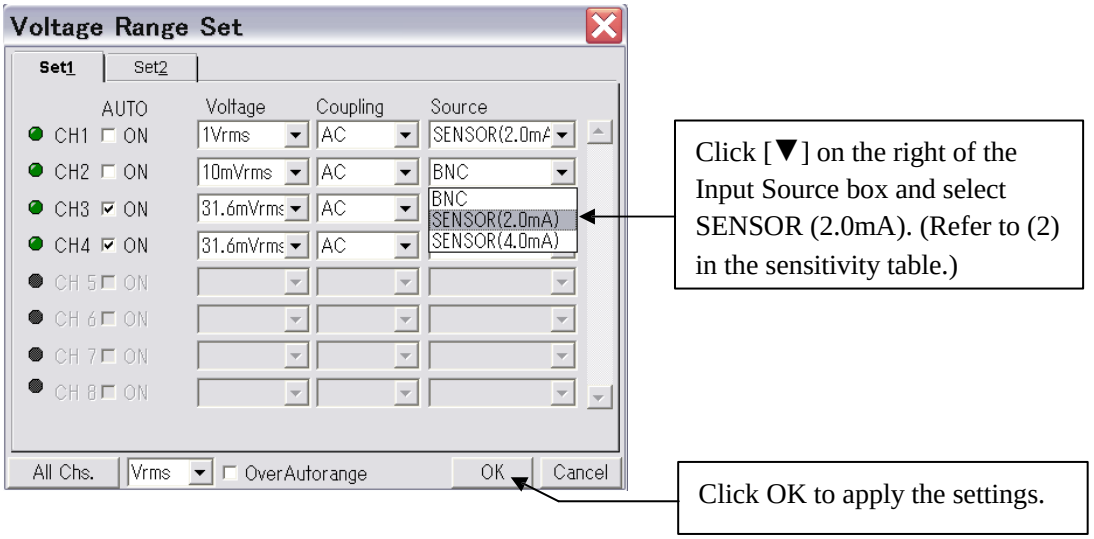
Set the sensitivity, operating conditions, etc. of the sensor connected to the FFT analyzer. The following shows a case where a piezoelectric accelerometer based on the following sensitivity is used.



Double-click the icon of DS-0221FFT to start the application. If a personal computer is connected with the measurement unit, the relay contact generates sound.



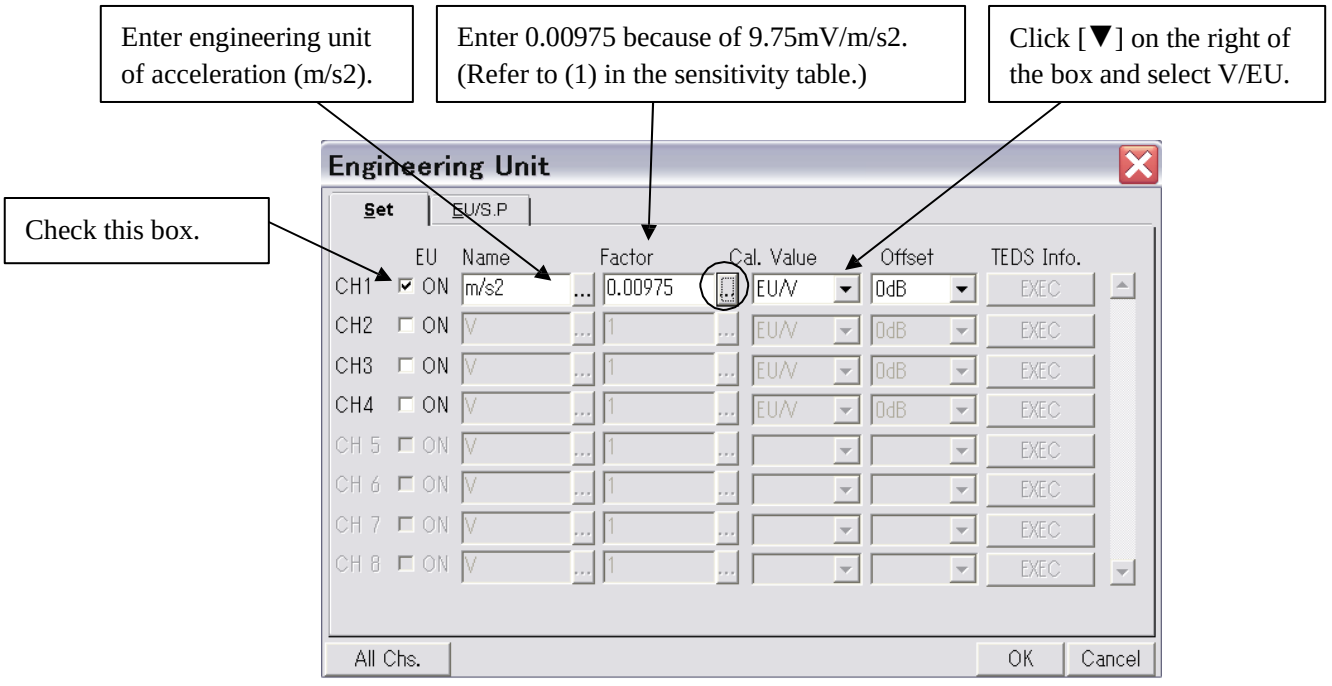
Select the Input menu and then select Voltage Range Set.



3-2 Engineering Unit Setup

Set the sensitivity of the sensor in order to directly read amplitude values using engineering unit.

Select Unit / Calibration from the Input menu.



* Numerical values and characters can be input from the keyboard. Further, clicking [...] on the right of the text box displays a pad for numerical and text input.

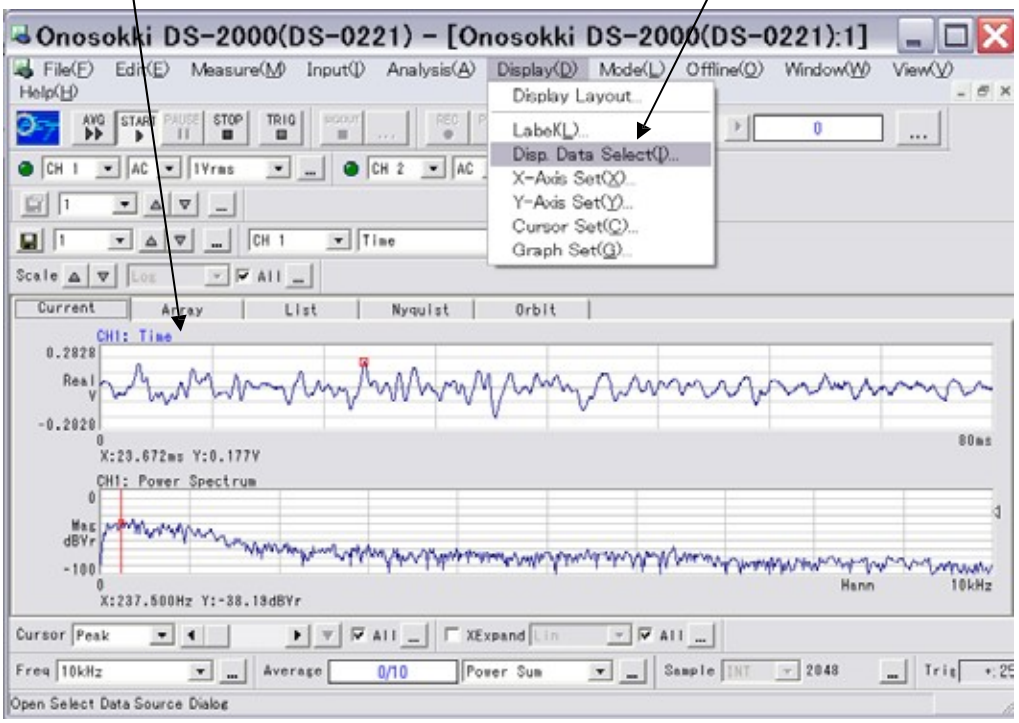
4. Starting Measurement

4-1 Voltage Range and Frequency Range Setup

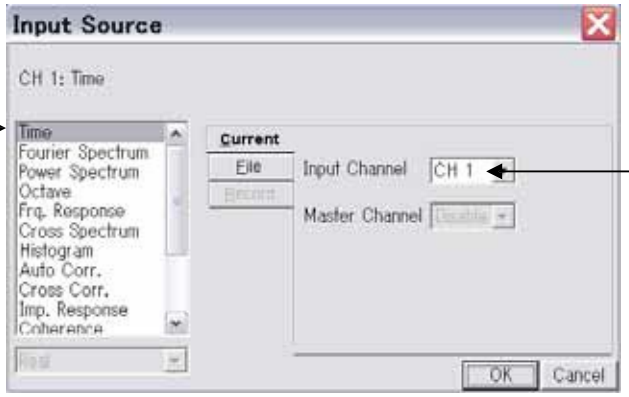
First, observe the vibration waveform.
Since the screen displays power spectrums of CH1 and CH2 with the initial setup, select time-axis display of a channel subjected to signal input.

Click the comment area to activate it.

Select Disp. Data Select from the Display menu.



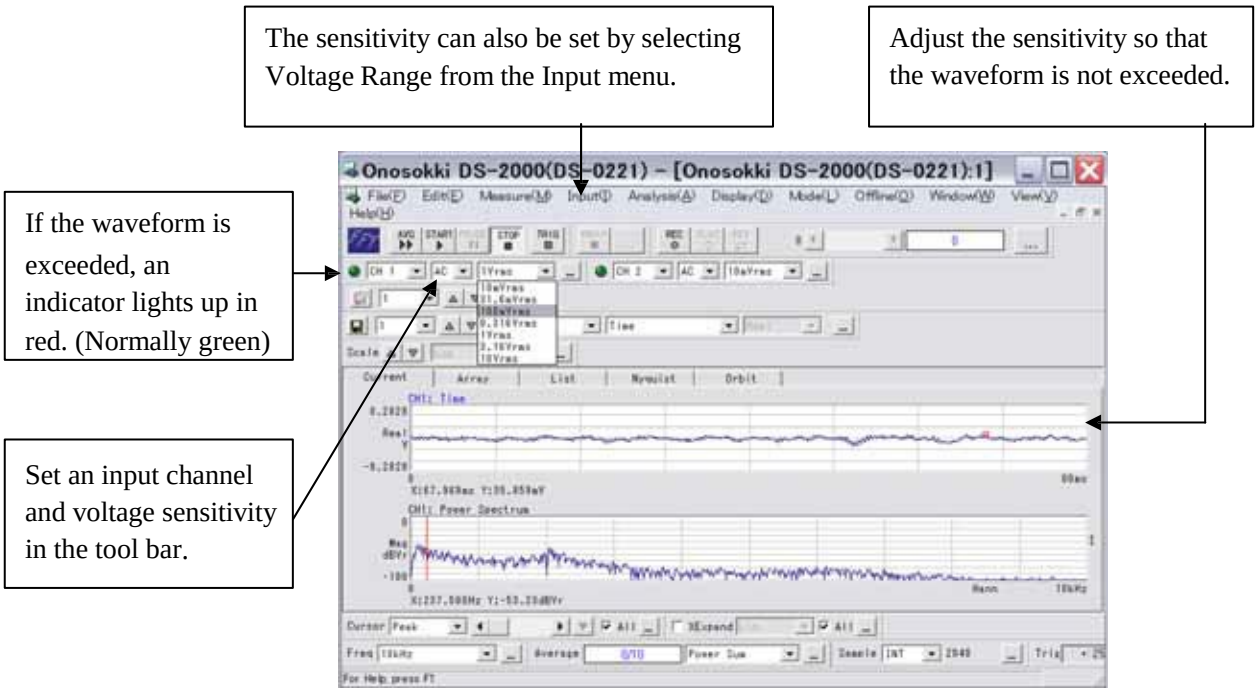
Select a function to be displayed.



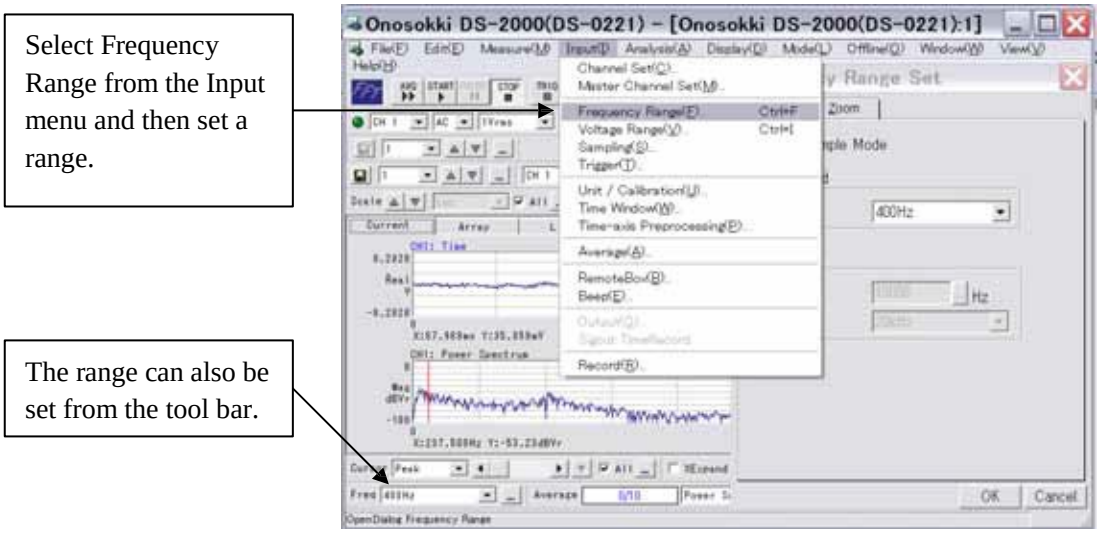
Select an input channel.

* Double-click the comment area to display the Disp. Data Select dialog.
  Display the power spectrum of the input channel in the same manner.

Set the voltage sensitivity while monitoring the magnitude of the input signal. Make setting so that the waveform fits into the time-axis display screen.
Click the Input menu and select Voltage Range (in the same manner as 3-1, "Input Source Setup) or select a button in the tool bar.



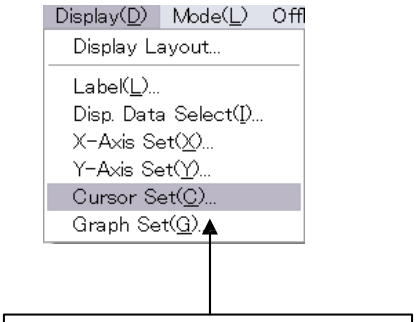
Set a frequency range. Narrow down the range while monitoring the power spectrum.



* With the initial setup, the signal is sampled at 2048 points resulting in a frequency resolution of 1/800. Therefore, the narrower the frequency range, the higher becomes the frequency resolution.

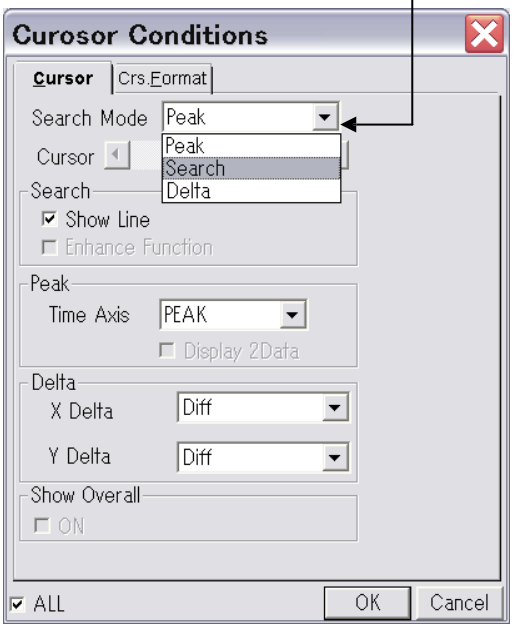
4-2 Cursor Function

Read the frequency and the amplitude of power spectrum using the cursor function. With the initial setup, the peak search function is selected and therefore the maximum amplitude is automatically searched for. Further, change the Y-axis scale as required.

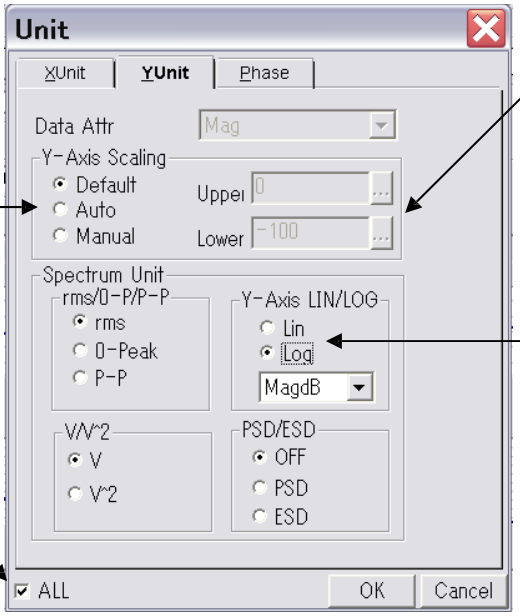


Select Cursor Set from the Display menu. To change the Y-axis scale, select Y-Axis Set.

Select Search.



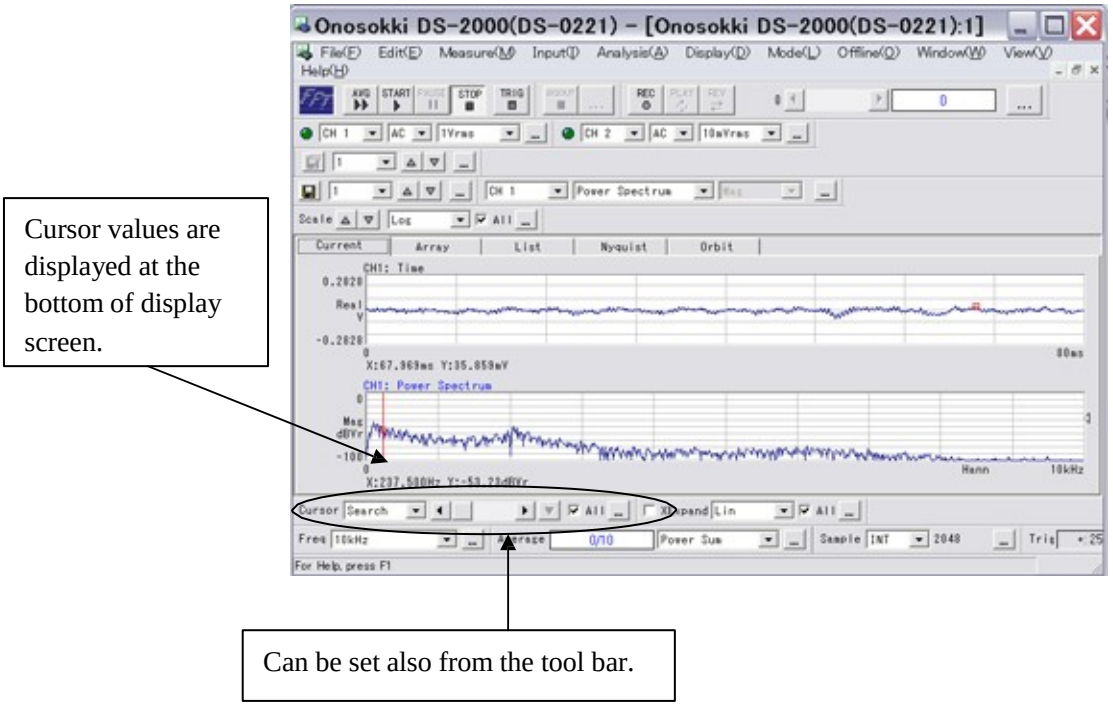
Select an option button.
- Default (initial setup)
- Auto (automatic setup)
- Manual (manual scale)



For Manual, set Upper and Lower limit values.

Select Lin or Log (logarithmic) scale. For vibration measurement, select Lin.

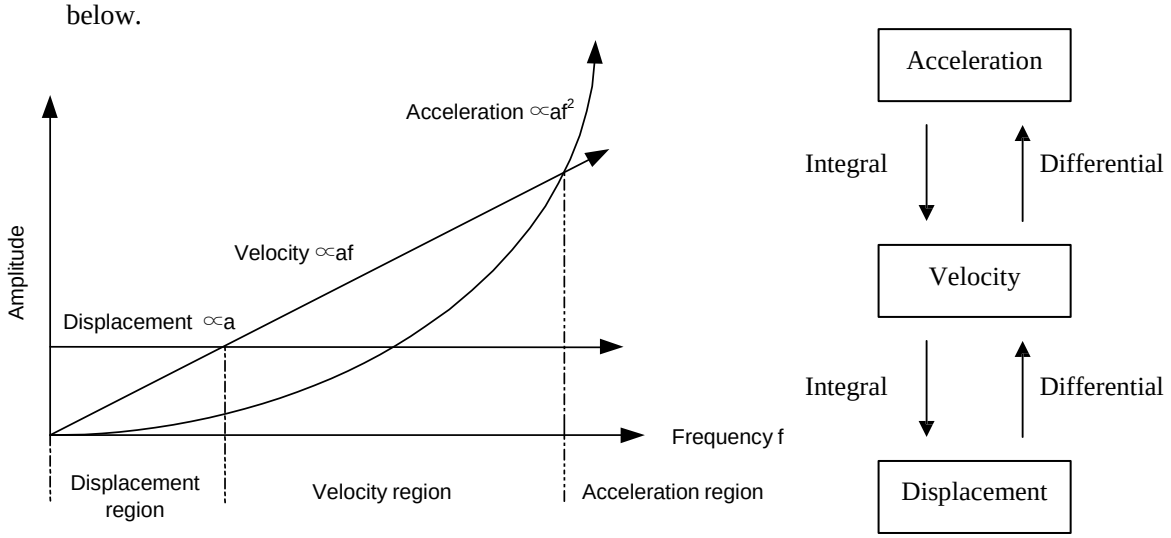
To make the same scale setting for all screens, check this box.



* Menu can be easily opened by right-clicking on the screen.

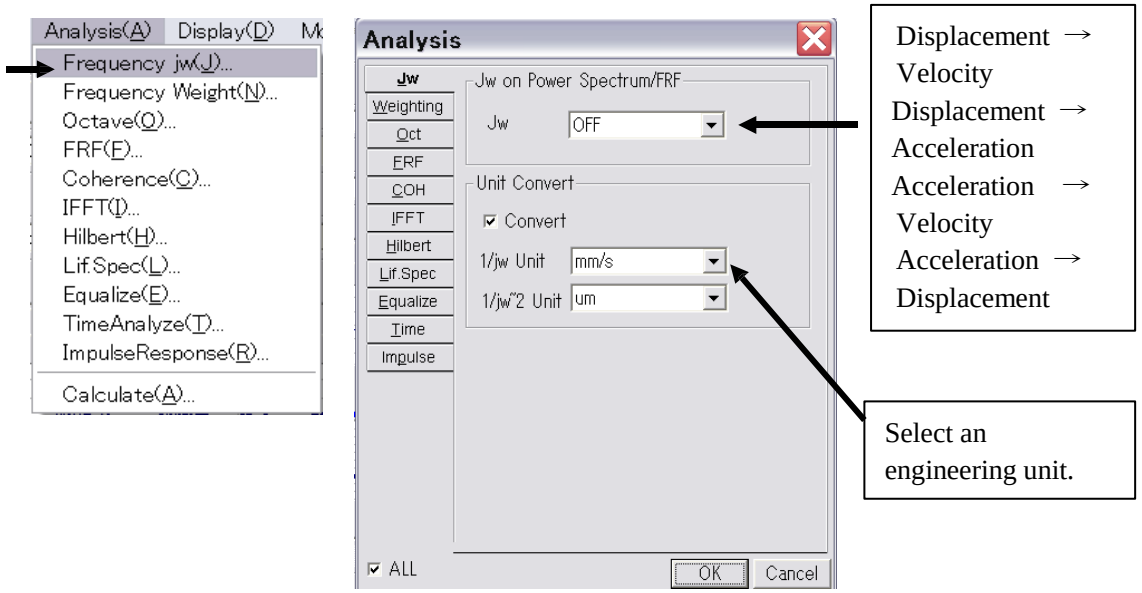
4-3 Frequency Differential/Integral

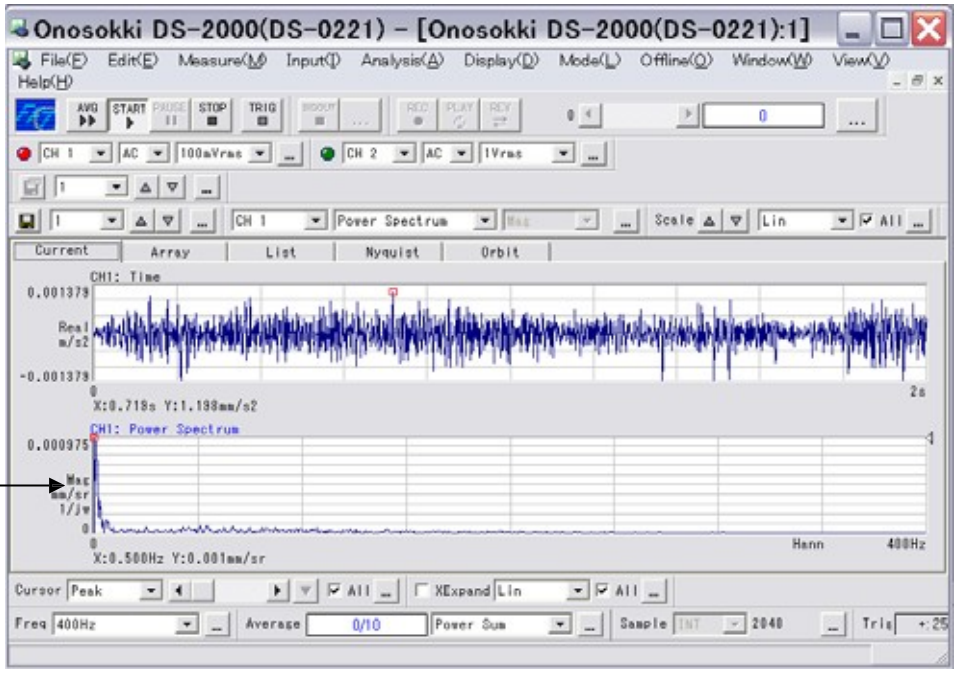
At the time of vibration measurement, the vibration quantity is handled as acceleration, velocity, and displacement depending on the frequency to be measured. Relation between units is shown below.



* Generally, the amplitude of the displacement, velocity, and acceleration increases at 10Hz or below, at 10Hz to 1kHz, and at 1kHz or above, respectively.

Perform frequency integral. Activate the spectrum screen, click the Analysis menu, and select Frequency jw.



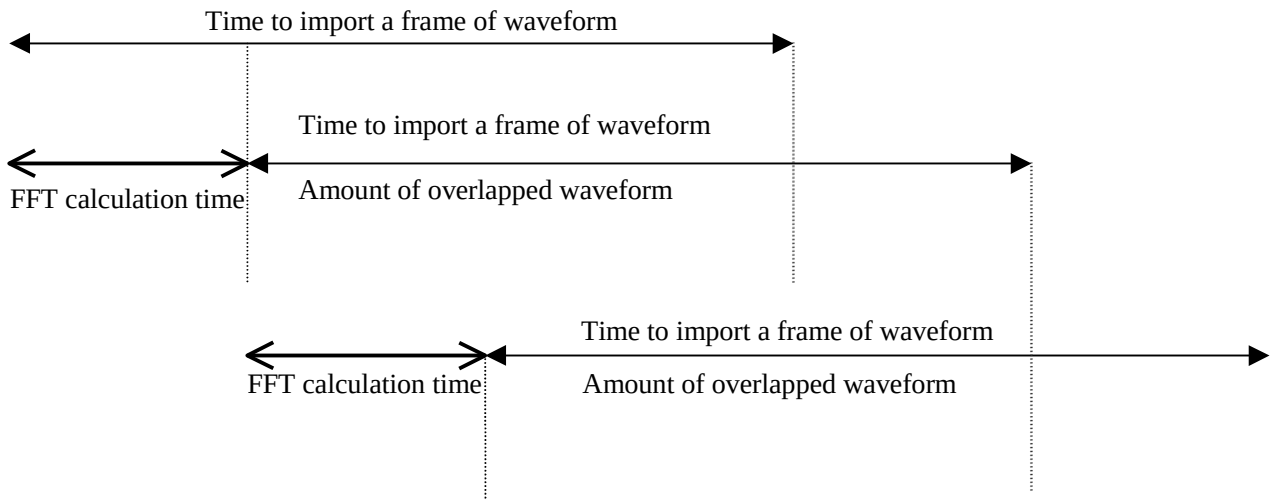


Perform single integral to convert acceleration to velocity.

5. Processing and Saving Data

5-1 Averaging

Averaging is performed in order to improve data accuracy. Here, summation averaging of a general power spectrum is performed. At the time of averaging, it is necessary to perform overlap processing according to the frequency range. Overlap of data occurs if the signal capture time is longer than the FFT operation time. The lower the frequency range, the longer becomes the capture time and the more remarkable becomes overlap. With the DS-2000, overlap occurs except in the MAX range (40kHz) in the case of a 4-Ch system.



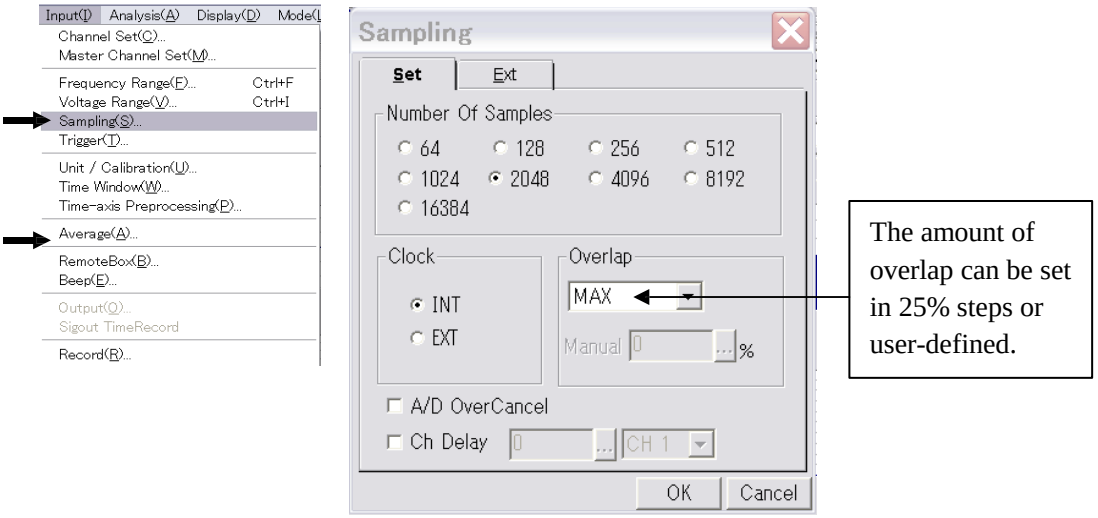
* In the above waveform,

(⟷) Sampling time that is necessary for the FFT analysis

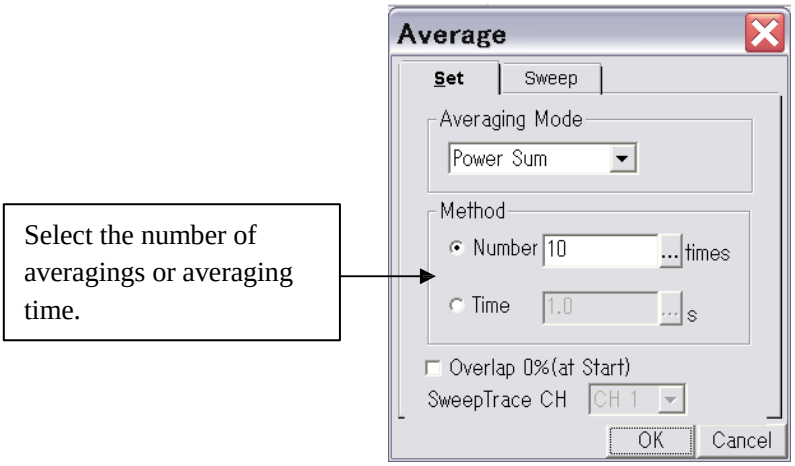
(⟷) Time for a single FFT calculation

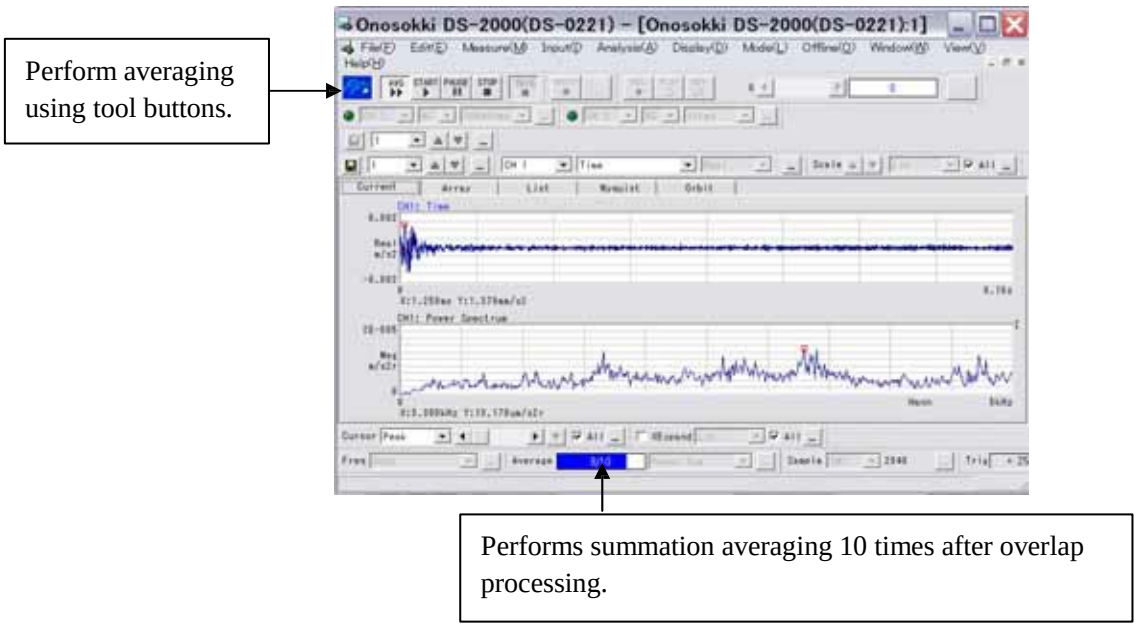
Therefore, the overlap amount is after deducting the FFT calculation time from the FFT capture time. The same data is arithmetically averaged while overlapping.

Select Sampling from the Input menu.



* When the amount of overlap is set to 0%, new data is averaged. However, if the frequency range is very low, processing takes long time. In this case, the number of averaging can be increased or average time can be set. Select Average from the Input menu.

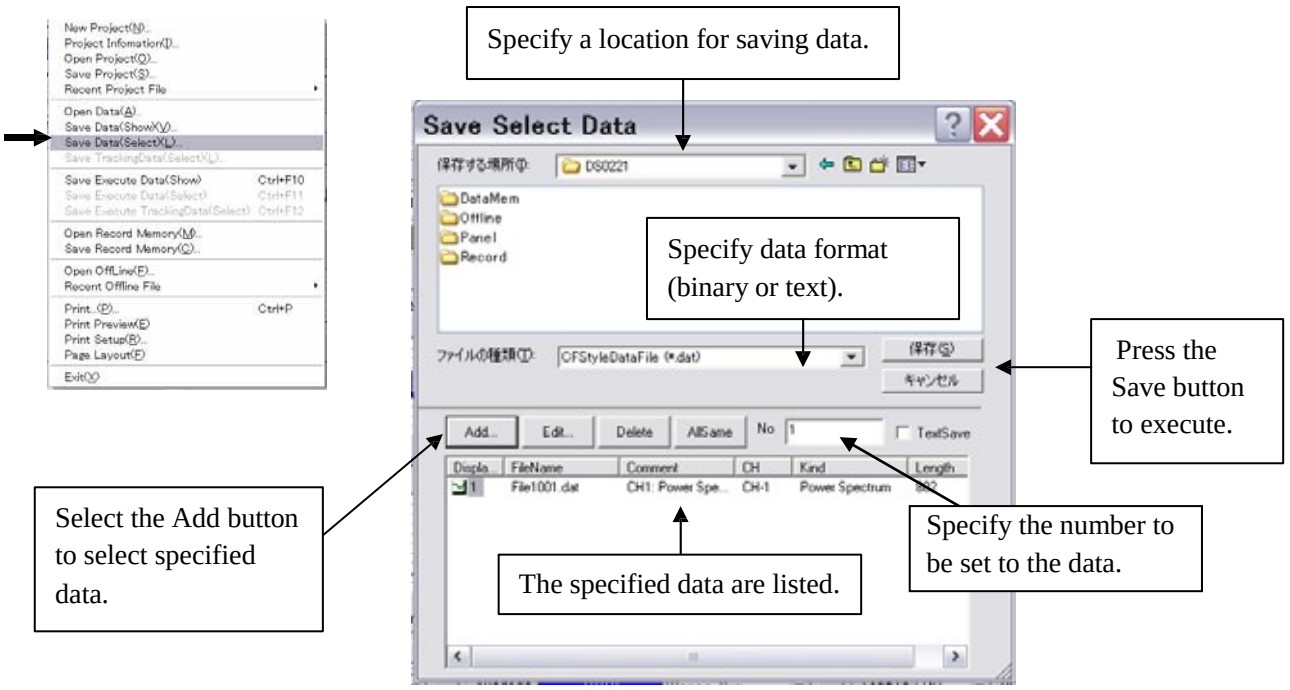




5-2 Saving Data

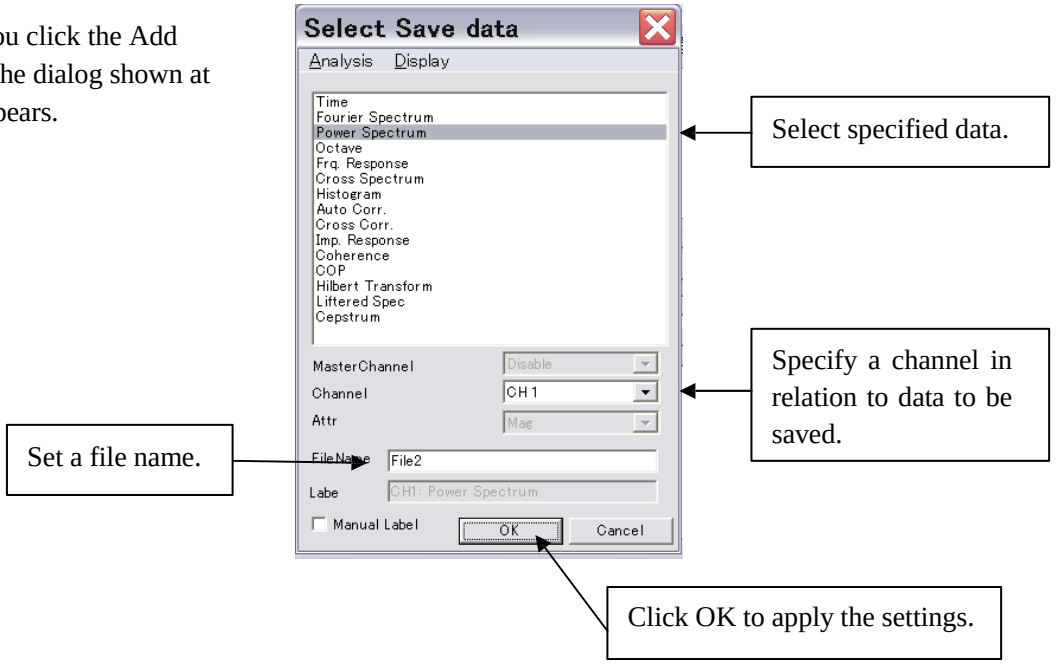
Save measurement results. All data currently displayed on the screen can be saved simultaneously, or only specified data can be saved. Procedures for saving specified data are shown below.

Select Save Data (Select) from the Input menu.



* .dat denotes the binary format and .txt the text format.

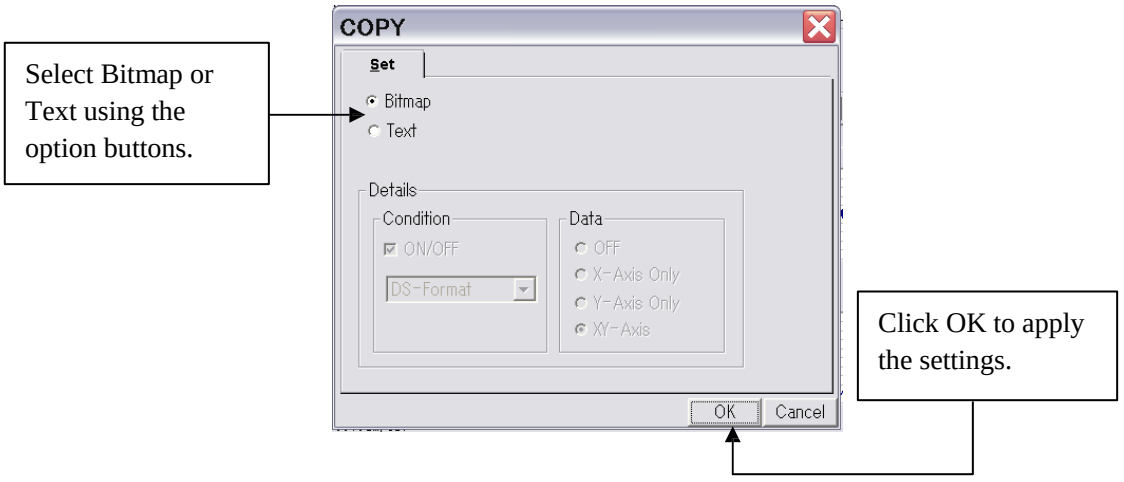
* When you click the Add button, the dialog shown at right appears.



5-3 Copy Function

Measurement data can be temporarily put in the clipboard. The data in the clipboard can be easily pasted to other applications without saving.

Select Copy Setup from the Edit menu.



After determining the data format with Copy Setup, select Copy from the Edit menu.

CAUTION:

1. The copyright of this procedure manual is reserved by Ono Sokki Co., Ltd.
2. Duplication without prior permission is prohibited.
3. This procedure manual explains general measurement procedures. Ono Sokki assumes no responsibility for data obtained through a specific operation performed by the customer.