

CF-7200A

Portable 2-channel

FFT
Analyzer

CF-7200A

Lightweight, compact and highly portable
The de facto standard for the next generation,
for worldwide use



Portable Size **Multi interface** *Direct Operation*



ONOSOKKI

Portable 2-channel FFT Analyzer

CF-7200A

Multi

Flexible Data Sharing

Accepts USB, Compact Flash Card, and other general-purpose interfaces for compatibility with PCs and easy data sharing in the existing environment.



All Operations by Buttons & Touch-panel

The CF-7200A needs no mouse - simply press buttons for all operations. The click-feel buttons and touch panel allow immediate operations ranging from start/stop of analysis to display of basic functions.

An Advanced FFT Analyzer
Meeting Sophisticated Needs on Site

The CF-7200A Has Arrived

In this easy-to-use FFT analyzer designed for modern needs, all aspects of the CF Series have been upgraded. With improved PC compatibility and a much smaller size of the main body, the CF-7200A delivers quick and easy measurement and analysis, yet with exceptionally high accuracy. Integrating all on-site needs into its compact body, the CF-7200A is a multi-functional high-performance analyzer that will become the de facto standard for the next generation.



Interface



Direct Operation



Portable Size

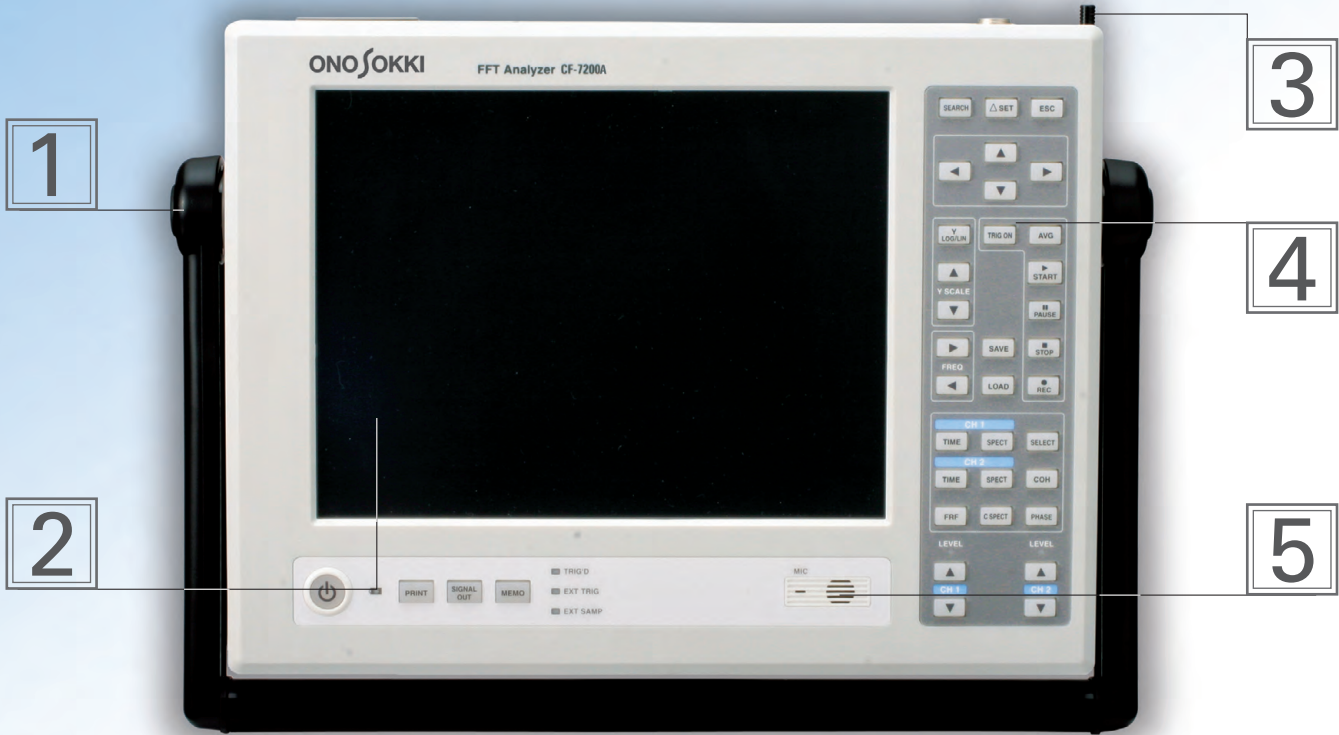
Lightweight, Compact and Highly Portable for All Sites

A troublesome setup and installation on site are not required any longer, such as connecting a personal computer, cables, and power supply to a measuring instrument. All functions necessary for measuring and analyzing noise and vibration are built into the CF-7200A's small file size, for greater flexibility on all sites.

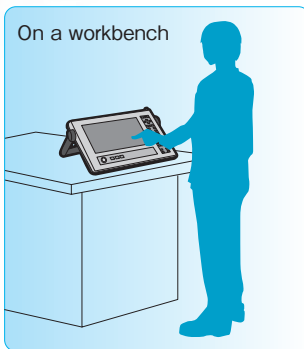


On-site Flexibility Sets a New Standard for FFT Analyzers

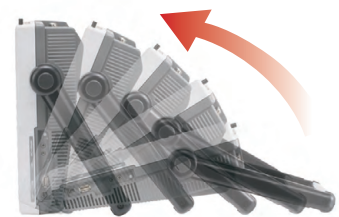
All Field-oriented Functions Integrated into Small File Size



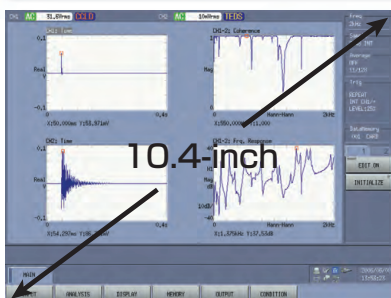
1 Flexible Placement Assists Your Measurement



360-degree rotary handle for setting at any angle



2 Large Screen allows Legible and Easy Input



Thanks to the 10.4-inch TFT liquid crystal display, data can be read easily even though QUAD display mode is selected. Simple and easy operations by touch panel.

3 Screen memos make the work efficient



With the supplied stylus pen, comments, marks and memos can be entered directly, making it easier to recognize the data. The memo is also saved when saving the data. It can choose whether to show the memo or not.

4 Simple Button Operations



Selection of main data, selection of the input voltage range and frequency range, and saving and loading of data can be performed directly with the hardware keys on the front panel. The CF-7200A offers simple, easy operations and much more. Even when observing a signal with unknown magnitude and frequency, an appropriate range and display conditions can be set quickly with button operations. Start/stop of signal output* can be made only by pressing ON/OFF button. (* Option:CF-0771)

5 Voice Memos Supports Data Arrangement



Equipped with a speaker and microphone for voice recording. Voice memos can be attached to data and played back while the data is displayed, supporting data arrangements. There are also connectors for an external speaker and microphone, allowing you to create voice memos away from the measuring place.

Input and Output Connectors Conveniently Designed on Top



6 Automatic Sensor Data Input with TEDS

Each channel is equipped with a CCLD (power supply for sensors) which can directly drive an accelerometer, a microphone, and other sensors requiring a power supply. TEDS reads data retained in a TEDS sensor and then automatically supplies the power to the sensor and performs unit calibration.

TEDS
CCLD

* TEDS

TEDS, an abbreviation for Transducer Electronic Data Sheet, is an information description format for sensor-specific information, prescribed by the IEEE1451 Series. When TEDS data is implemented in a sensor, the sensor has a function called "plug-and-play sensor" which allows sensor data (sensitivity, weight, etc.) to be transmitted and recognized by a measuring instrument connected. As a result, troublesome unit calibration, which can easily lead to errors, can be performed automatically.

* CCLD

CCLD, an abbreviation for Constant Current Line Drive, is a method for driving a constant-current type preamplifier incorporated in a sensor. Either an accelerometer or microphone with a built-in preamplifier can be driven by connecting it to a signal input terminal.

Cable Disconnection Detecting Function

Automatically detects cable disconnection of an accelerometer and a microphone*, preventing trouble before measurement.



* Intended for sensors with a built-in constant-current type preamplifier.

7 Connects Rotation Detector Directly

Equipped with an exclusive connector which directly connects a rotation detector*¹ and can be used as an external sampling clock. This makes it easy to perform order ratio analysis*² which analyzes noise and vibration of engines, motors, and other rotating machineries with rotation-based values.

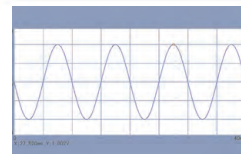
*¹ Applicable to the MP-981/LG-916.

*² CF-0722 (option) Tracking Analysis Function Software is required.

8 Noise/Vibration-Free Operation with cooling fan OFF

CF-7200A can be operated under the condition of noise/vibration-free up to about 5 minutes by means of cooling fan off. Since the CF-7200A itself would not be the source of noise/vibration, analyzing or recording for subtle noise/vibration is easy without worrying about self-noise/vibration.

9 Visual and Aural Check of Phenomena



&

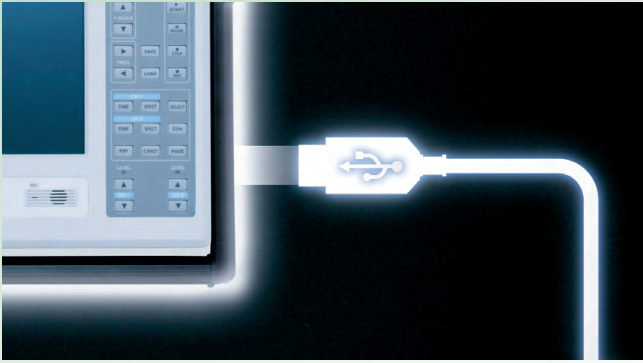


The signal coming from an acoustic or vibration sensor connected to each channel can directly be checked aurally with headphone, and visually on the display. You can monitor whether an intended vibration or sound is input correctly by both the waveform and the sound. It makes the sensor setting and operation easier.

Meticulously Designed for Easy Operation on Site

Smooth and Reliable Operations on a Desk

USB Mass-storage Function



The USB mass-storage function makes it possible to transfer data of the CF-7200A to a PC through a USB cable* directly. There is no need to eject storage medium and special software (Windows®XP).

* USB connector : mini-B type

Accepts Large-capacity CF Cards



Up to 8GB* of data can be recorded in a high-speed CF card (compact flash memory card*), enabling long-time recording of a large volume of data.

* CF card made by Ono Sokki.

Data Recording Function*¹



The data recording function is equipped which can record signal waveform to a memory card with a press of the REC button. This function can do much for analysis of long-lasting phenomena and hard-to-detect phenomena on the CF-7200A later. Further analysis using PC-based sound and vibration analysis software etc. is enabled.

CF card capacity (bytes)	512M	1G	2G	4G	8G
Recording time (approx. minutes)	8	16	33* ³	33x2* ³	33x4* ³

2-channel, range of 100 kHz, data only

*¹ CF-0722 (option) is required for recording rotation data.

*² Recording format: ORF (Ono Sokki Record Format)

*³ Maximum recording time at a single time

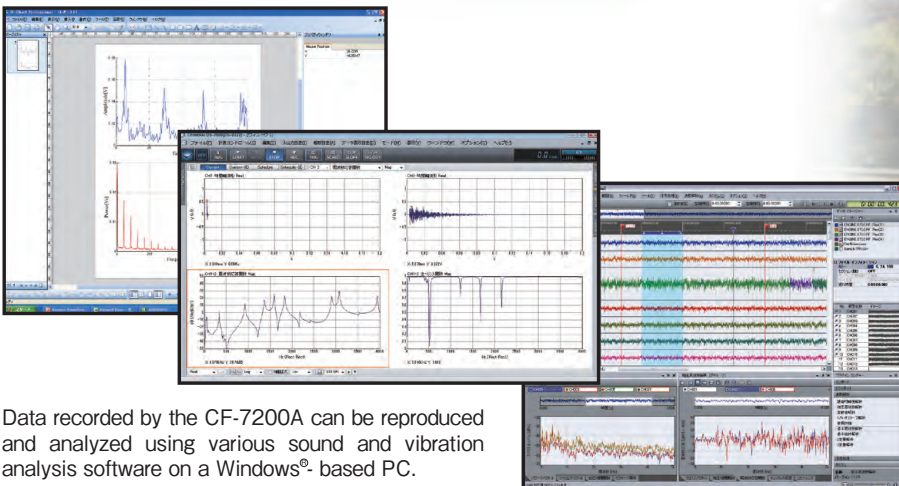


Saving Data in Various Formats



Three types of data (DAT, TXT, BMP formats) can be saved. TXT or/and BMP format can be selected as well as DAT format according to your data processing device such as office software, PC-based FFT software, and CF main unit.

Diverse Data Processing on a Desk



Data recorded by the CF-7200A can be reproduced and analyzed using various sound and vibration analysis software on a Windows®-based PC.

* See page 12 for details.



Outdoor noise analysis using the CF-7200A and the LA Series Sound Level Meter

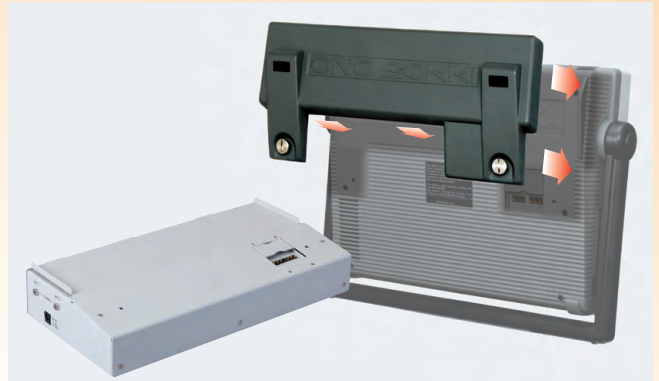
Highly Portable Analyzer for Use Anywhere

Weighs just 3.8kg



The main unit of the CF-7200A weighs about 3.8kg*. Compact, light weight, and easy to carry around with you.
* Excluding battery pack

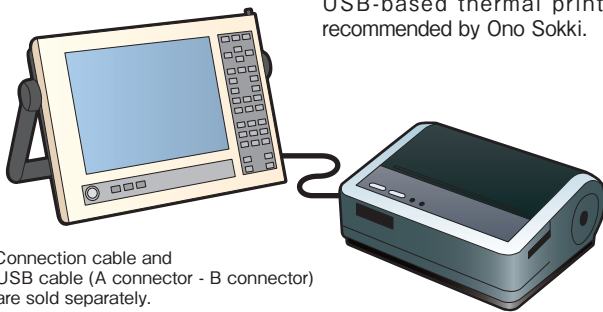
4-hour Battery Operation



By using the detachable lithium rechargeable battery, the unit can run continuously for about 4 hours*. Measurement can be performed, even outdoors or where no power supply.

* Without signal output, at 25°C ambient temperature

Printing Function



Display data can be printed to a USB-based thermal printer recommended by Ono Sokki.

* Connection cable and USB cable (A connector - B connector) are sold separately.

Remote Control



With the remote controller* (DS-0295), selected three main operations can be performed in addition to analysis start/stop. You can operate the CF-7200A away from the working or supervising position.

* Option

State-of-the-art Technologies and High Specifications, All in a Compact Body



Frequency range

10mHz ~ 100kHz

Voltage input range

10mVrms ~ 31.62Vrms

Data recording

**100kHz range max.,
2 channels**

Number of analysis points

6400 points max.

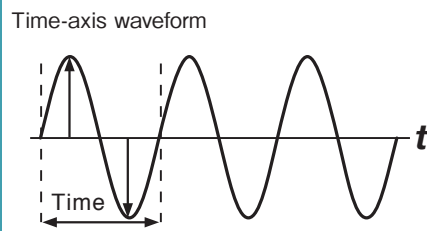
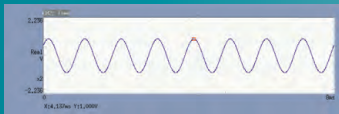
Sound measurement of electronic components using the CF-7200A and the MI Series measurement microphone

ANALYSIS

New Possibilities for Measurement and Analysis, from Laboratories to Production Sites

Time-axis Waveform

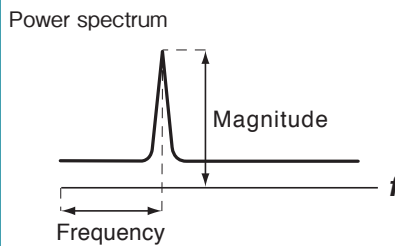
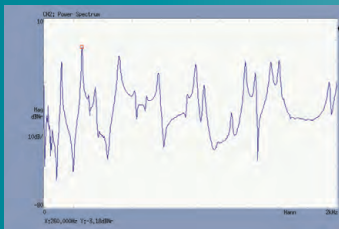
TIME



Performs A/D conversion of the direct waveform of an electrical signal (such as vibration, noise, pressure, and strain), coming from a sensor and then displays the result as time-domain data. The X- and Y-axis values at any point can directly be read using the search cursor. The delta cursor function makes it easier to read the time difference and level difference.

Power Spectrum

SPECT

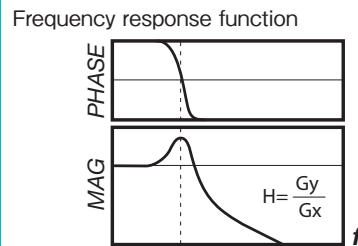
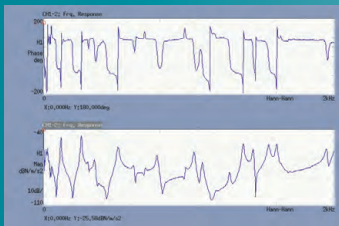


The power spectrum indicates the magnitude of frequency components contained in a sampled time-axis waveform. Frequency analysis enables detection of abnormal conditions of a facility, which are difficult to estimate through measurement of vibration and noise level and observation of direct time-axis waveform. The natural frequency of a structure can also be measured.

Frequency Response Function

FRF

PHASE



The frequency response function indicates the ratio of output to input and the frequency characteristics of phase difference. The resonant frequency and phase of a structure can easily be obtained accurately by entering the signal of vibration force to Ch1 generated by an impulse-force hammer or shaker, and then inputting the response (signal of acceleration, velocity and displacement) to Ch2.



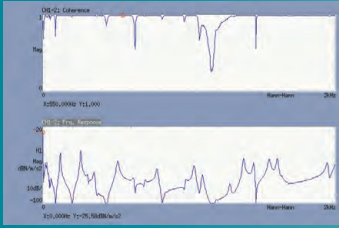
Hammering measurement with the CF-7200A, the GK-3100 Impulse-force Hammer and the NP Series Accelerometer



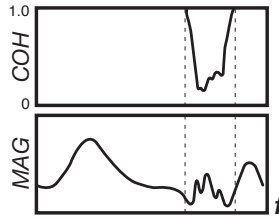
Analysis of micro-object using the LV Series Laser Doppler Vibrometer and a magnetolectric shaker

Coherence Function

COH

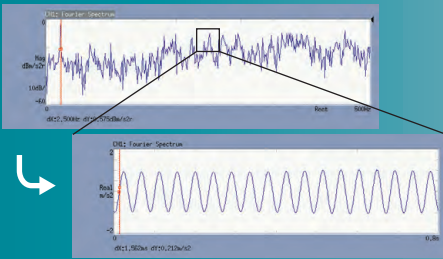


Coherence function

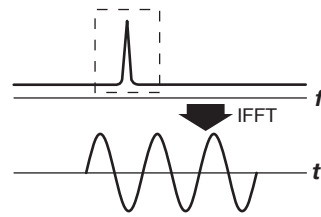


The coherence function is for evaluating the linearity and correlation of input and output of a transmission system, obtained in the frequency domain. The rate of contribution of the input signal to the output signal is represented as a digit from 0 to 1 for each frequency, for evaluating the reliability of the frequency response function, locating a key factor from multiple noise and vibration sources, and evaluating the correlation.

Inverse Fast Fourier Transform (IFFT)

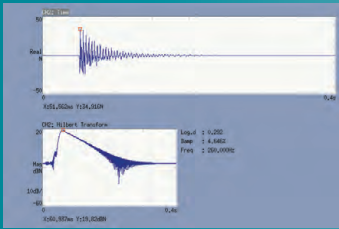


Inverse Fast Fourier Transform (IFFT)

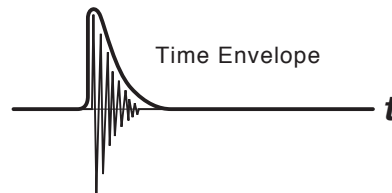


After frequency analysis, a time-axis waveform of a selected band can be obtained again by performing Inverse Fast Fourier Transform (IFFT) for the selected frequency band. For example, by selecting a waveform portion excluding an unnecessary frequency band confirmed in the FFT result and then performing Inverse Fast Fourier Transform (IFFT) for it, a time-axis waveform can be obtained with the selected high frequency band eliminated.

Hilbert Transform

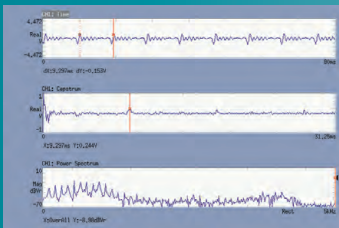


Hilbert transform

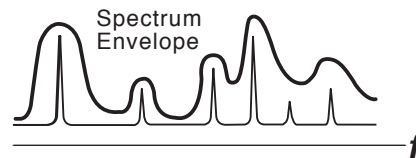


A logarithmic damping factor can be obtained by obtaining a time envelope of a time-axis signal by means of Hilbert transform.

Cepstrum

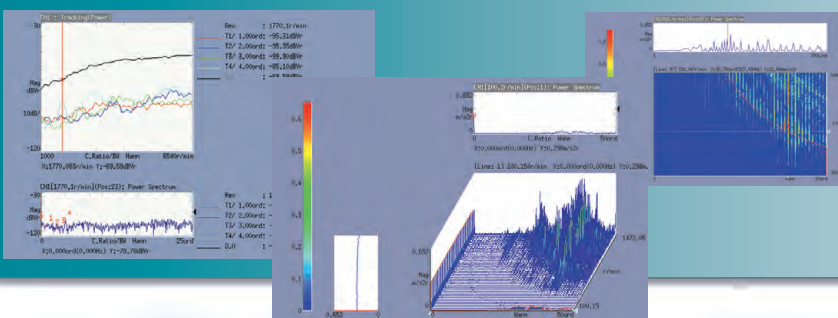


Cepstrum



Cepstrum is obtained by performing Fourier transform of the power spectrum again, allowing detection of the periodicity contained in the spectrum. In addition, eliminating reflected waveforms and extracting fundamental frequency by estimating a spectrum envelope from the Cepstrum. Cepstrum can be applied to make an analysis of the sound waves, seismic waves, biowaves, etc.

Tracking Analysis Function



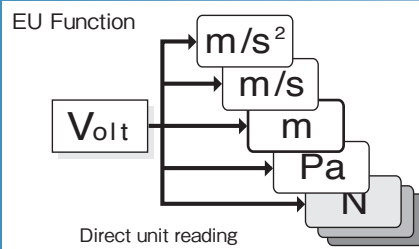
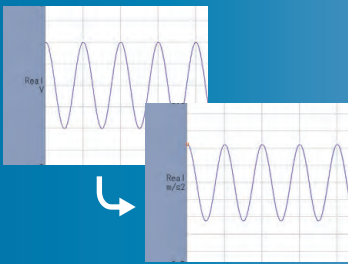
For automobile or office equipment with built-in rotating equipment such as engine or motor, resonance occurred between rotation speed and natural frequency of each part would be a serious problem. Tracking Analysis Function helps to solve the problem.

*CF-0722 Tracking Analysis Function Software is required. See page 14 for details.

FUNCTION

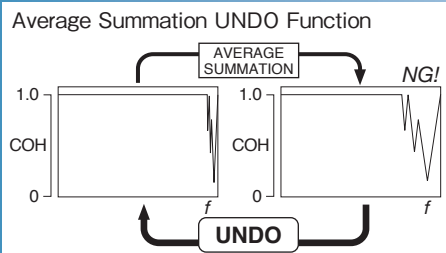
Multiple Applications with a Single CF-7200A

EU Function



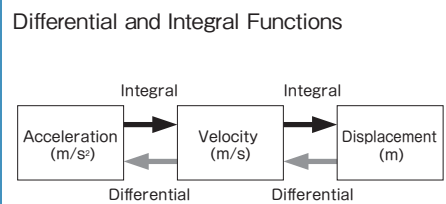
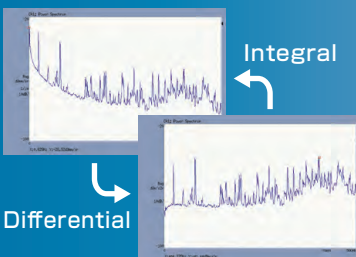
The CF-7200A FFT analyzer can not only directly read values as a voltage (V) but also as a physical quantity. When the input sensitivity has been set and calibration with a reference signal is performed for each sensor, waveform values are converted to physical quantities then displayed, eliminating the need to convert from voltage values to physical quantities.

Average Summation UNDO Function



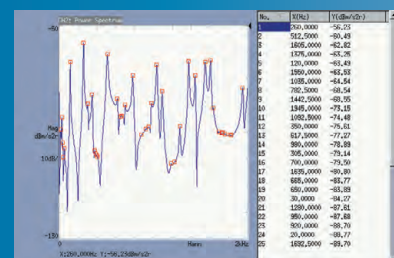
This function is used during average summation to UNDO one average summation. For example, if you end up with a bad result of summation in impulse-force hammer shaking, you can cancel the result data (by UNDOing the summation) and then try the summation again.

Differential and Integral Functions



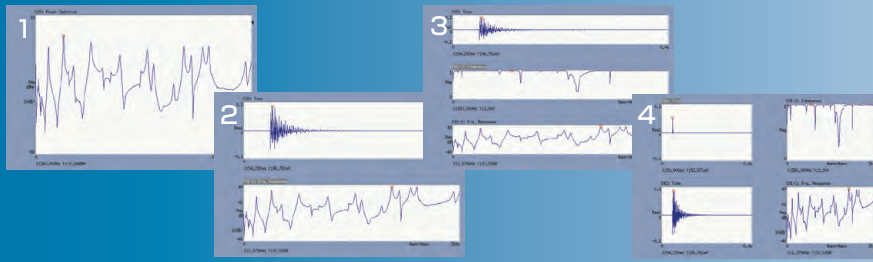
First and second order differential operations and single and double integral operations are possible for time-axis and frequency-axis waveforms. Data from an accelerometer can be converted to velocity and displacement; and velocity data from a laser doppler vibrometer can be converted and displayed to acceleration and displacement. When the EU function is used together, unit conversion (among "m/s²", "m/s" and "m") is also performed automatically.

List Display



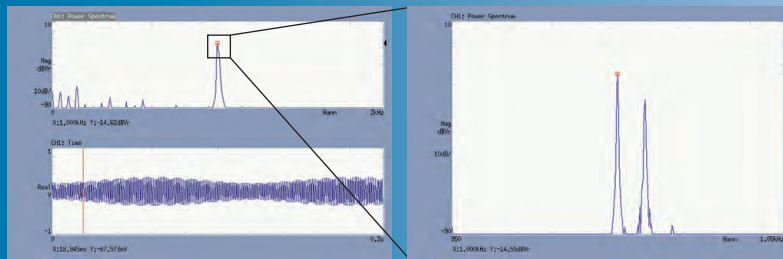
This function displays a list of X-axis and Y-axis values for selected points on a displayed waveform. Numeric list for 40 points selected, peak value list and harmonic list enable numeric values to be simultaneously checked for multiple points. Also, the displayed data can be saved at TXT format. Numeric values at multiple selected points on waveform can be checked simultaneously such as numeric list for 40 points, peak value list and harmonic list.

Multi-screen



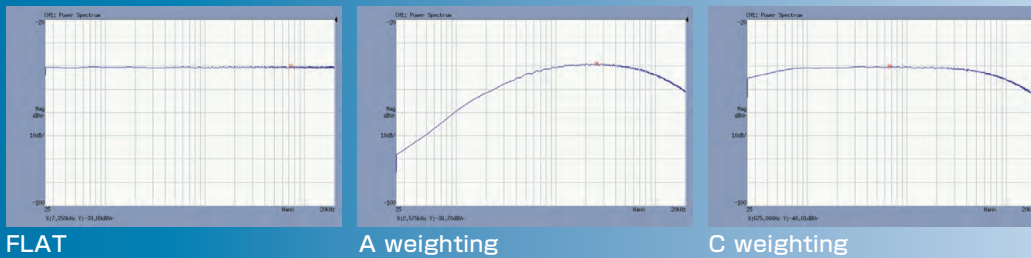
Display data can be arranged flexibly in the SINGLE, DUAL, TRIPLE and QUAD screen display modes. In the DUAL, TRIPLE and QUAD screen display modes, the difference can be viewed by means of overlay display.

Zooming Analysis



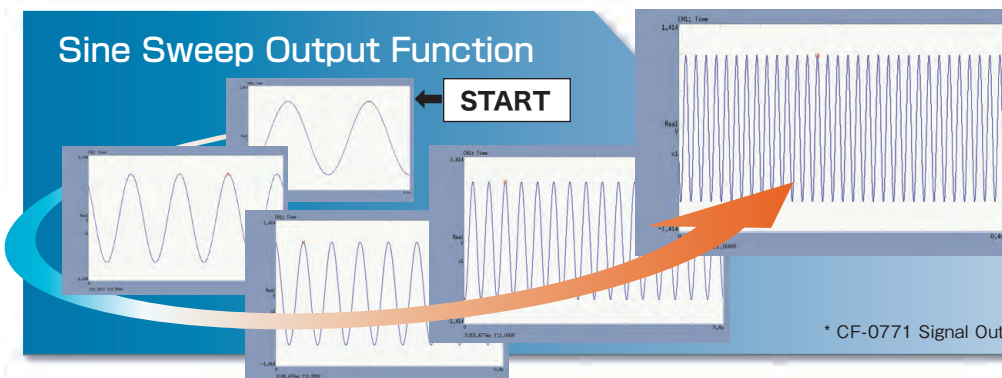
In frequency analysis, zooming analysis of selected frequency domain is possible. This function is useful for more detailed frequency analysis, for example, analysis of beating and other waveforms involving indistinguishable adjacent frequency components.

Frequency Weighting Filters



Frequency weighting filters such as A and C are provided. This makes it easier to perform auditory sense correction in microphone-based acoustic analysis.

Sine Sweep Output Function



**SIGNAL
OUT**

By entering the signal from shaker, accurate frequency response function can be obtained with sweep average using in combination with signal output function of the CF-7200A.

* CF-0771 Signal Output Module (option) for 1ch is required.



Vibration measurement in a plant using the CF-7200A and the NP Series Accelerometer



Rotational vibration measurement of a large blower using the CF-7200A

A Variety of Software for Diverse Applications

Portable 2-channel FFT Analyzer

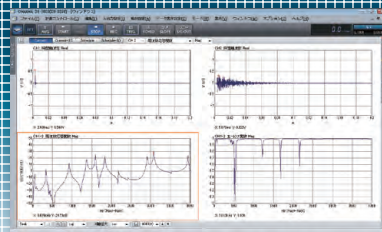
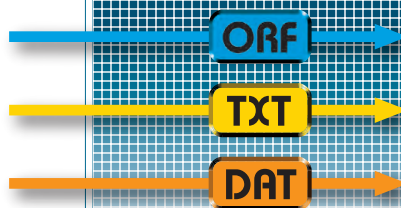
CF-7200A



Multi-channel Data Station

DS-3000 Series

Sound and Vibration Real-time Analysis System



OS-2000 Series

Time-series Data Analysis Software

ORF

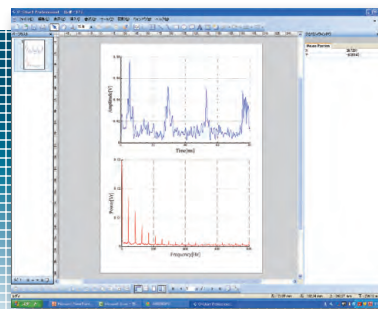


OC-1300

Multi-function Graph Creating Software

TXT

DAT



BMP

TXT

Applicable to commercial spreadsheet software

<Functions>

Function	CF-7200A Data Format
Off-line analysis	ORF format
Report	DAT format, TXT format, BMP format

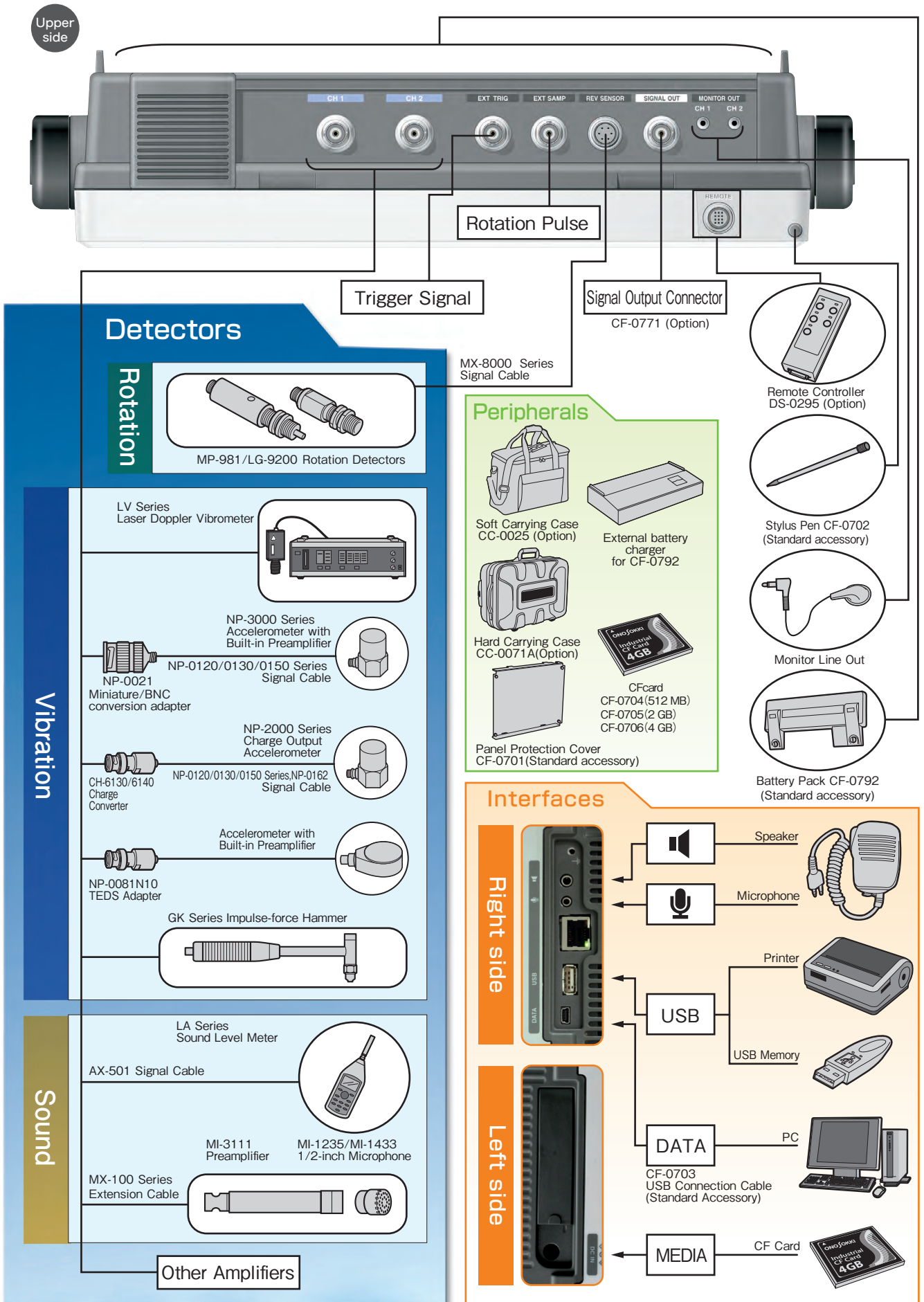
<Software>

Model name	Product name
DS-3000 Series	Sound and Vibration Real-time Analysis System
OS-2000 Series	Time-series Data Analysis Software
OC-1300 Series	Multi-function Graph Creating Software

* Refer to each brochure for details.

System Configuration of CF-7200A

Diverse options and peripheral devices can be added according to intended applications, expanding the possibilities for the portable FFT analyzer.



Tracking Analysis Function

Equipments with built-in rotating machines, such as engines and motors in products like automobiles and office equipments, may have some problems of quality and performance due to noise and vibration by these rotating machines themselves or transmission.

Taking automobiles as it is example, when the rotation speed of the engine changes, vibration is caused to the automobile from the frequency corresponding to the rotation speed. In home appliances, an air conditioner's compressor or fan motor also causes various changes in noise and vibration depending on the rotation speed.

If the product's resonance frequency and the rotating vibration frequency by the rotating machine are same, resonance will occur, which may cause the trouble and worse quality due to increase of unpleasant noise and vibration.

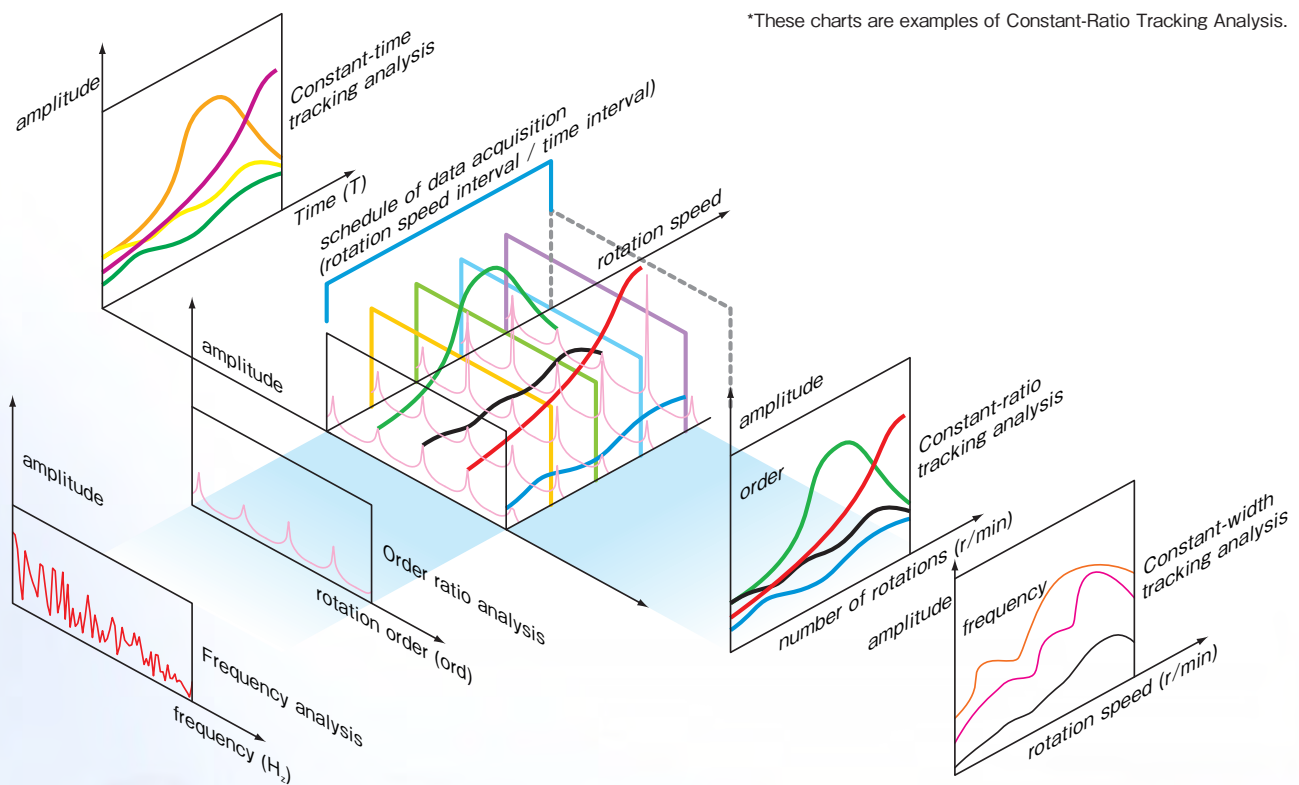
Tracking analysis greatly helps in analyzing ever-changing noise and vibration depending on the rotation speed such as which rotation speed increases noise and vibration, which rotating part causes this noise and vibration, and how many times of the

frequency component (order) of noise and vibration to the rotation speed occur.

Using the CF-0722 Tracking Analysis Function (option) makes it possible to analyze rotating equipments based on the rotation speeds of under measurement obtained by rotation detectors (MP-981 or LG-9200) that can be connected directly to the CF-7200A.

The CF-0722 performs FFT analysis on noise and vibration while maintaining synchronization with changes in rotation speed within an arbitrarily setting range of rotation speed. It continuously saves and accumulates an order-ratio-analysis graph, which is represented in multiple of rotation speed, with the specified conditions.

It is then possible to create multiple simultaneous plots in accordance with changes in rotation speed by specifying the noise and vibration orders of interest. It is also possible to visualize the phenomena of ever-changing noise and vibration due to rotation with many different types of graph.



*These charts are examples of Constant-Ratio Tracking Analysis.

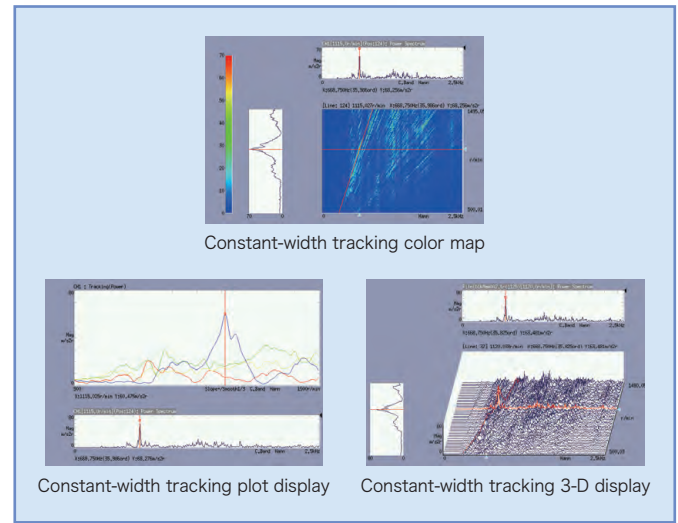
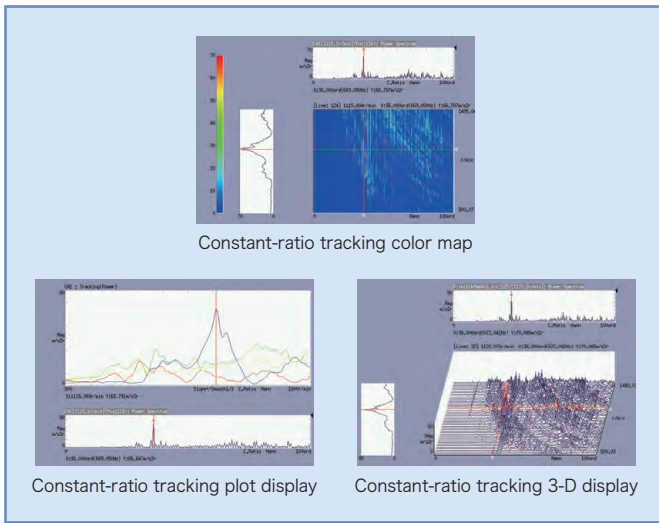
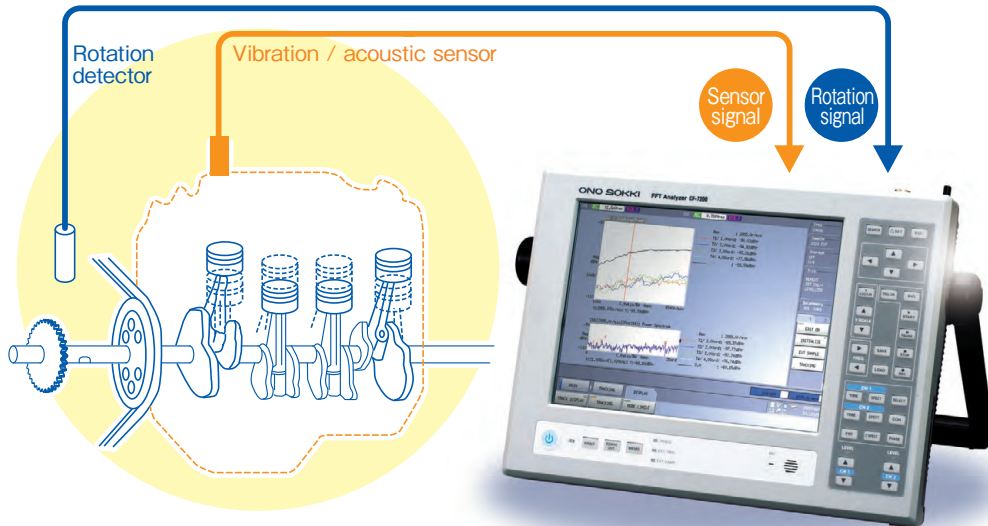
It is possible to measure noise and vibration over time as well as changes in rotation speed.

Equipping the CF-0722 Tracking Analysis Function (option) with the CF-7200A makes it possible to greatly improve the performance of analyzing noise and vibration due to rotation.

Note: Rotational order indicates the multiple of rotation speed.

A phenomenon that occurs once per a rotation is defined as a 1st-order rotation component; n times the number of rotations is defined as an n-order rotation component.

It can express the analysis of noise and vibration, which is caused and influenced by the gear's number of teeth at the transmission or the number of balls of ball-bearings.



Adding the optional CF-0722 Tracking Analysis Function makes it possible to perform constant-ratio tracking / constant-width tracking / time tracking analysis and recording with the rotation data. You can use the recorded data (ORF file) to perform off-line analysis.

Notes for performing constant-ratio and constant-width order tracking analysis

Constant-ratio order tracking

Tracking analysis is performed by using the rotation pulses obtained from the rotator as an external sampling clock. It plots the changes in the spectrum level of order component of interests corresponding to the rotation speed.

- The order-analysis resolution is fixed regardless of rotation speed.
- In case of the signals resembling random noise without any clear peak as order component, the frequency's bandwidth (resolution) becomes high at the higher rotation speed. Therefore, there is a tendency of the spectrum numerical value becoming large.

Constant-width order tracking

Frequency analysis is performed via an internal sampling clock. Each time the rotation speed changes, the frequency of the order of interest is measured from the frequency range and the rotation speed at that time. A plot is then created for the changes in the spectrum level of this frequency component corresponding to the changes in rotation speed.

- The frequency resolution is fixed regardless of rotation speed.
- With the low frequency range, it will be impossible to increase the rotation speed ratio so higher comparing with the constant-ratio order tracking.
- It is necessary to determine the maximum frequency before setting the number of analysis order (because the upper-limit frequency is limited by setting the frequency range).

Specifications of Portable 2-channel FFT Analyzer CF-7200A

1. Input Section			
Number of input channels	2 channels		
Input configuration	Isolated single-ended		
Input connector	BNC (C02 type)		
Power supply for sensor (CCLD)	Supplies the current to a constant-current type sensor via a coaxial cable from the input connector (BNC connector) +24V / 4mA		
IEEE1451.4 (TEDS)	Accepts an IEEE1451.4 (TEDS)-based sensor		
Input impedance	1MΩ±0.5% 100pF or less		
Input coupling	AC	-3dB at 0.5Hz or less	Automatically set to AC when CCLD is used.
	DC	-	
Absolute maximum input voltage	100Vrms AC for 1 minute (50Hz)		
Amplitude voltage range	+30dBVrms	31.62Vrms	-40dBVrms to 30dBVrms in all 8 steps
	+20dBVrms	10.00Vrms	
	+10dBVrms	3.162Vrms	
	0dBVrms	1.000Vrms	
	-10dBVrms	0.3162Vrms	
	-20dBVrms	0.100Vrms	
	-30dBVrms	31.62mVrms	
	-40dBVrms	10.00mVrms	
Input range step	10dB		
Input level monitor	OVER	Over: Red LED ON (95% F.S. or more)	
	FINE	Appropriate level: Green LED ON (-12dB F.S. or more)	
Auto range	Whenever the 1-frame data is sampled, the amplitude voltage range changes automatically if input range-over occurs.		
A/D converter	16 bits		
Dynamic range	90dB or higher: +30 to -30dBVrms range	800 lines, Hanning window,	
	70dB or higher: -40dBVrms range	50 times averages, 20°C, high-pass filter OFF	
Harmonic distortion	-75dB: 20kHz to 100kHz -80dB: 20kHz or less		
Aliasing	-80dB or less		
Amplitude flatness	20kHz or less: ±0.1dB 20kHz to 100kHz: ±0.2dB (0dBVr or less)		
Full-scale accuracy	±0.1dB at 1kHz		
Amplitude linearity	±0.015% at F.S.		
Cross-talk	-100dB or less		
Channel to channel Gain accuracy	20kHz or less: ±0.1dB (0dBVrms or less)	Gain accuracy measured in the same voltage range	
	20kHz to 100kHz: ±0.2dB (0dBVrms or less)		
Channel to channel Phase accuracy	20kHz or less: ±0.5deg (0dBVrms or less)	Phase accuracy measured in the same voltage range with Equalize OFF, same voltage range ±0.1deg (typ.) with Equalize ON	
	20kHz to 100kHz: ±1.0deg (0dBVrms or less)		
DC offset	-60dB F.S.	Auto zero ON, +30 to -20dBVrms range (DC coupling)	
	-40dB F.S.	Auto zero ON, -30 to -40dBVrms range (DC coupling)	
Trigger	AUTO ZERO: Collective operation of all channels		
	"TRIG ON" LED goes ON when trigger function turns ON		
	LED (TRIG'D) blinks when triggered		
	Position	±8191	
	Mode	Free / Repeat / Single / One-shot	
	Source	1 channel / 2 channels / External trigger signal	
	Slope	+ / - / ±	
	Hysteresis level	Arbitrary setup	
	Trigger level	Arbitrary setup	
	External trigger	Input connector: BNC (C02 type)	
Input voltage: ±10V			
Input coupling: AC / DC			
Input frequency: 100kHz max			
Hysteresis level: Arbitrary setup (default 500mV)			
Input impedance: 100kΩ			
Filter (Simultaneous use of filters not possible)	A weighting	Conforms to IEC 60651-1979 TYPE1, ANSI S1.4-1983	
	C weighting	TYPE1, and JIS 1505-1988 TYPE1	
	High-pass filter	10Hz (-18dB / oct), 100Hz (-18dB / oct)	
Low-pass filter	1kHz (-18dB / oct), 10kHz (-18dB / oct)		
External sampling input	EXT SAMP Connector BNC (C02 type) input	Input voltage: ±10 V / TTL	
		Input impedance: 100kΩ	
	REV SENSOR Connector R03-R6F input	Input coupling: AC / DC	
		Hysteresis level: Arbitrary setup (default 500mV)	
Input frequency: 256kHz (direct sampling not possible)			
* BNC (C02 type) input or rotation signal input is selected. Simultaneous input not possible			
Remote control	When the DS-0295 Remote Controller is connected, start / stop and operations by custom-selection are possible.		
Audio input / output for voice memo	Audio input and playback with a built-in microphone and speaker Voice memo can be stored by linking the measurement data. External connection has priority.		
	External MIC input: φ2.5 stereo mini jack input (L side)		
	External SPEAKER output: φ3.5 stereo mini jack output (L side)		

2. Display Functions			
Display mode	SINGLE screen display mode / DUAL screen display mode / TRIPLE screen display mode / QUAD screen display mode / OVERLAY display mode		
3D (colour) Display	X-axis	Number of samplings	Number of lines
		16384 (max)	6400 (max)
	Z-axis	10/20/30/50/100/200/400	
	Angle of Z-axis	45/60/75/90	
	Y-axis	50/100/150/200	
	Display mode	3D (Color) / 3D (Color) & data / 3D (Color) & data & trace	
List display mode	Harmonic / Total Harmonic Distortion (THD) Peak list display / Arbitrary point list / Octave list display / Can be saved at TXT format		
Label function	Input	Direct handwriting using a stylus pen	
	Color	8 colors	
	Line type	3 different thicknesses	
	Display	Show / hide	
Search function	Delta function	X mode / Y mode / XY mode	
	Partial OA / Peak / p-p / MAX-MIN / Search enhance		
Vertical axis unit	rms / PEAK / 0-p / p-p / V / V ² / PSD / ESD Automatic unit conversion function Unit conversion by integral / differential operations (displacement ↔ velocity ↔ acceleration)		
Vertical axis scale	Auto / Manual / Default / Gain / Phase unwrap function / Delay		
Horizontal axis unit	Hz / r/min / ORDER / s(sec) / EXT		
Horizontal axis scale	Default / Zooming with delta cursor		
Calculation function	Differential and integral operations / FRF equalization / Inverse Fast Fourier transform / Hilbert transform / Damping calculation by half-value width method / Arithmetic operation		

3. Display Unit	
Size	10.4-inch
Method	TFT color LCD with touch panel function
Resolution	800 x 600 dots
Lighting (back light)	Cold-cathode tube, 2-level brightness adjustment (Bright/Dark) (back light power saving timer: 1 minute to 60 minutes)

4. Analysis Section

Frequency accuracy	±0.005% of reading value (±50ppm)		Time-axis waveform processing function	The time-axis waveform processing function can be selected with soft keys. First and second order differentials / Single and double integrals	
Frequency range	10mHz to 100kHz			Absolute value conversion / DC cancel / Trend elimination / Smoothing / Hilbert transform	
Sampling frequency	Frequency range x 2.56 (internal sampling)		Real-time analysis	40kHz / 2 channels (internal sampling: 4096 points)	
Number of sampling points / analysis points	Number of sampling points	Number of analysis points	Search enhance	Calculation resolution	x32
	256	100		Y-axis accuracy	±0.1dB
	512	200	Averaging mode	Number of averaging setups: 1 to 65535 times Averaging setup time: 0.1 to 999 seconds (in 0.1-second steps) Averaging can be stopped in terms of the number of times or time.	
	1024	400		Time domain	Summation average / Exponential average
	2048	800		Frequency domain	Summation average / Exponential average / Peak hold / Subtraction average / Sweep average / Fourier average / Max OA
	4096	1600		Amplitude domain	Summation average
8192	3200	A/D-over cancel / Double hammer cancel / Averaging permission select function (ADD+1) / Averaging undo function			
16384	6400	FFT operation	32-bit floating point (IEEE single-precision format)		
Overlap processing	MAX / 66.7% / 50% / 0% / Arbitrary setup				
Window function	Rectangular / Hanning / Flat-top / Force / Exponential / User-defined				
Delay function	Time frame of channel 2 can be delayed by 0 to 8191 points with reference to channel 1.				

5. Processing Functions

Time domain	Time-axis waveform / Auto-correlation function / Cross-correlation function / Impulse response / Cepstrum / Liftered envelope / Hilbert transform	
Amplitude domain	Amplitude probability density function / Amplitude probability distribution function	
Frequency domain	Spectrum	Power spectrum / Fourier spectrum / Cross spectrum / Phase spectrum
	Frequency response function (FRF)	Real part / Imaginary part / Nyquist diagram / H1 / H2 / Equalized waveform of FRF / Coherence function / Coherence output power / Coherence blanking
	Miscellaneous	Power spectrum to 1/1 octave / Power spectrum to 1/3 octave / Vibration sensory correction (horizontal / vertical)

6. Memory Functions

Data record	Frequency range	100kHz(max)(40kHz max. when tracking analysis)	File format	Analysis data can be saved simultaneously with three different formats: DAT, TXT and BMP(TXT and BMP selectable). The list data displayed can be saved simultaneously in TXT format.	
	Recorded channel	Ch1&Ch2 (100kHz max), recording not possible for one channel.		Panel condition memory	50 types
	Recording time	8GB: Approx. 33 minutes x 4 (Ch1 and Ch2 at 100kHz)	Contents of panel condition memory	Memorizes parameters which can reproduce all software and hardware settings in the panel condition memory mode.	
	Recording format	ORF	Voice memo memory	300 data items or less (depending on the CF card capacity)	
	Max. recordable memory capacity	8GB (in a card slot)	Handwritten memo memory	300 data items or less (depending on the CF card capacity)	
	Record number	Automatic numbering by main unit start/stop operation	Recording device	Main unit built-in memory (fixed) or CF card can be selected.	
	Event mark number	Arbitrary numbering by [MARK] button operation		Main unit built-in memory x1 (cannot be replaced by user)	
Off-line analysis	ORF FFT analysis is possible at recording frequency range or lower.	Card slot (CF card) x1			
Data file	Max. recordable memory capacity	300 data items or less in internal memory / 300 data CF card (depending on the CF card capacities)	CF card insertion / removal warning LED: When LED (green) is lit, insertion or removal of memory card is inhibited.		
	Auto store function	Interval or averaging end			

7. Input/Output Functions

Interface	USB	Number of ports	2	Printer output	Printer interface	USB
		Standard	USB Ver.1.1 / 2.0(High Speed)		Device	Accepts thermal printers of recommended model
		USB (type A)	For USB Ver.1.1 printer / USB memory		Source	On-line data
		DATA (mini B type)	For USB Ver.2.0 USB node function		Source	Saved data
External SPEAKER output	Number of connectors	1	Monitor output	Number of connectors	2 (Each connector outputs Ch1 or Ch2 data)	
	Maximum output	100mW or more		Output voltage	1Vrms F.S. ±1% for input voltage range F.S. (1kHz sine wave, 1MΩ loaded)	
	Impedance	8Ω		Impedance	Approx. 33Ω	
	Voice memo	Playback		Source	Input signal (after analog filtering)	
	Connector	Accepts φ=3.5 stereo mini jack (L side)		Connector	φ=2.5 monaural jack	
	Output adjustment	By software				

8.Signal Output (CF-0771) — Option

Number of channels	1		Frequency range	0.1mHz to 100kHz (sine wave) Band limiting not possible		
Output connector	BNC (C02 type)		Harmonic distortion	-70dB or less Prescribed with 1V _{0-p} amplitude value		
D/A converter	16 bits		Output ON/OFF	Turned ON or OFF with the SIGNAL OUT button (turned OFF at the time of activation) ON/OFF for each button		
Maximum output voltage	±10V (amplitude + DC offset)			ON	LED goes on when ON.	
Amplitude resolution	Approx. 2.5mV			OFF	LED goes off when OFF.	
Offset resolution	Approx. 5mV		Output waveform	Sine wave		
Output format	Unbalanced output			Swept sine		
Protection circuit	Short-circuit protection			Pseudo random		
Isolation	No isolation	No isolation between chassis and digital common		Random		
Output impedance	0Ω	Low impedance output (unbalanced)	Impulse			
	50Ω	±10%	Analysis frame length	256 to 4096		
Output current	50mA (If 10mA is exceeded, harmonic distortion, flatness, and crest factor are not prescribed.)		Zoom mode analysis	Possible for all waveforms		
	Continuous		Spectrum flatness	±1.0dB or less	20kHz to 100kHz	
	Output mode	Burst		Can be set from 1 to 32767 in 1-cycle steps Interval 62.5μs to 524s (can be set in 62.5-μs steps)		
				Single-shot		
			Continuous			
Time setup is possible.		±0.2dB or less	0 to 20kHz			
Sine Sweep	Able to output using in combination with sweep average		Crest factor	Sine wave	Approx. 1.41	
Taper function	The output can be gradually increased or decreased when the signal is turned ON or OFF.			Swept sine	Approx. 1.4 to 1.6	
	Taper rising time	1ms to 32s (in 1-ms steps)		Pseudo random	3.3 or less	
	Taper falling time	1ms to 32s (in 1-ms steps)		Random	3.3 or less	
			Impulse	32.0 or less		
			Pink filter	Analog filter: -3dB / oct ±1.0dB (prescribed for 20Hz to 20kHz)		

9.Tracking Analysis Function (CF-0722) — Option

Analysis section	Tracking analysis	Constant-width or Constant-ratio tracking analysis			
	Schedule	Rotation speed or time			
	Data type	Power spectrum or Fourier spectrum			
	Number of memory blocks	200 to 1,000			
	Maximum analysis order	6.25 to 800			
	Number of FFT sampling points	256 to 2,048 (default value : 1,024 points)			
	Order resolution	100 to 800 lines (default value : 400 lines)			
	Range of rotation speed under measurement (1 P/R input)	Maximum analysis order	Measurable rotation speed (r/min)	Number of sampling points/rotation	
		6.25	300 to 190,000	16	
		12.5	200 to 96,000	32	
		25	150 to 48,000	64	
		50	150 to 24,000	128	
		100	150 to 12,000	256	
		200	100 to 6,000	512	
	400	100 to 3,000	1,024		
800	100 to 1,500	2,048			
Analysis dynamic range	60dB F.S. or more				
FFT calculation speed	Approx. 20ms/ 2ch or less (2,048 sampling points)				
Display function	Time-axis waveform / Frequency analysis (amplitude and phase) / Tracking analysis (amplitude and phase) / Constant-ratio tracking analysis (amplitude and phase) / Constant-width order tracking analysis (amplitude and phase) / Constant-width frequency tracking analysis (amplitude and phase) / Time tracking analysis (amplitude and phase)				
3D (color) display	X-axis	Number of samplings	Number of lines		
		16,384 (MAX)	6,400 (MAX)		
	Z-axis	10/20/30/50/100/200/400			
	Angle of Z-axis	45/60/75/90			
	Y-axis	50/100/150/200			
Display modes	3D (color) / 3D (color) & data / 3D (color) & data & trace				
Processing function	Exponential averaging / Maximum amplitude order tracking / Partial overall tracking / Smoothing processing (2 types)				
External Sampling (Rotation Pulse) signal input	Number of input pulses	0.1 to 1,024 pulses/rotation			
	Input impedance	100 kΩ			
	Input coupling	DC or AC coupling (0.5Hz / -3dB)			
	Input voltage range	±10V			
	Detection level	TTL or arbitrary setup (set in 1% steps)			
	Hysteresis level	Arbitrary setup (default value 0.5 V; range 0.1 to 20 V)			
	Slope	+ (rising) or - (falling); marked by plus and minus signs (+/-)			
Pulse waveform monitor	Waveform check is possible with EXT SAMP VIEW				
Maximum pulse frequency	3.2kHz (If the value is exceeded, use the pulse dividing function so that the maximum pulse frequency is not exceeded.)				
Pulse dividing function	1 to 1,024 (division in input circuit)				
Memory Functions	File format	Analysis data can simultaneously be recorded in three different formats. (select TXT or BMP)			
		Tracking data	TRC format		
	Data record*	Frequency range	40kHz max		
		Number of channels recorded	Ch1 & Ch2 (40kHz max) + Rotation data (recording not possible for one channel) formats		
Off-line analysis	ORF format Tracking analysis is possible with the frequency range at the recording or less.				

*The CF-0722 is required for data recording with rotation data.

10. Miscellaneous Functions

Condition view	List display of condition settings Can be saved in the XML (Text) format of condition.	Clock	Date (year, month, day) and time (hour, minute, second)
Remote controller (option)	Operating switches: 5 (START/STOP/F1/F2/F3)	Operation beep	Can be turned ON or OFF. The sound can be changed. (in conjunction with ON/OFF of warning beep)
	Settable at F1/F2/F3	AVERAGE	ON/OFF
		TRIG	ON/OFF
		DATA	SAVE
		SIGOUT	ON
REC	ON		
Warning beep	Can be turned ON or OFF. The sound can be changed. (in conjunction with ON/OFF of warning beep)		

11. General Specifications

Power requirement	Input voltage: 10.5 to 16.5VDC	Outer dimensions (not including the handle and protruded sections)	328mm(W) x 246mm(D) x 88mm(H) (battery not mounted) / 328mm(W) x 246mm(D) x 120mm(H) (battery mounted) / Refer to outer dimensions for details
Power connector	DC jack (EIAJ TYPE5) Outer side: Negative electrode, Inner side: Positive electrode	Carrying handle position	0° (top level position) / 30° / 60° / 90° / 110° / 130° / 180° (bottom level position)
Power consumption	Approx. 70VA (AC adapter used)	Main unit cooling	Forced-air cooling by an electric fan (can be turned ON or OFF. Can be turned OFF for up to 5 minutes.)
Operating temperature range	0 to +40°C		Operating noise
Storage temperature range	-10 to +50°C (including an external secondary battery)	Weight	Approx. 3.8kg / Approx. 5.1kg (battery pack mounted)
Functional grounding terminal	Grounding terminal for noise elimination		
Suspension of chassis	100 x 100 (mm) / Can be suspended by attaching a $\phi 5$ adapter		
Stylus pen	Can be stored in the main unit (accessory)		

12. AC Adapter

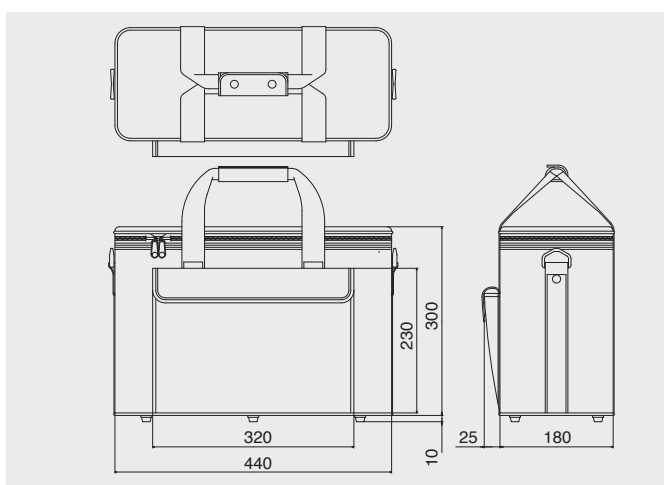
Input voltage	100 to 240VAC
Input frequency	50 / 60Hz
Output voltage	Rating 15V or 16V
Output current	Rating 4V
Safety standard	Electrical Safety Law / CE / UL

13. Battery Pack (CF-0792)

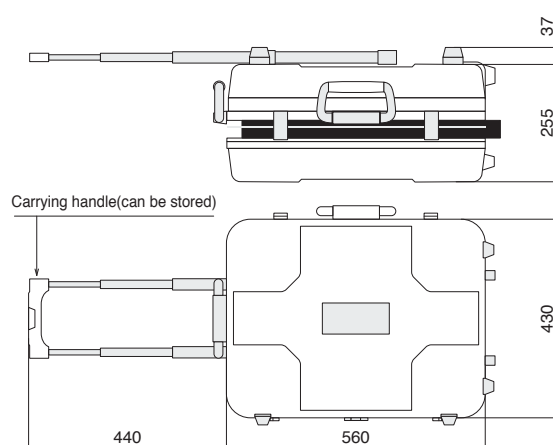
Battery	Lithium ion secondary battery
Shape	Fixed to the rear section of the main unit (detachable)
Operating time	Operates for 4 hours under standard operating conditions (2ch FFT analysis / Signal output option not mounted / 25°C room temperature with a new battery)
Remaining battery level display	Displays the remaining battery level when operating on the secondary battery. 4-level display
Minimum remaining battery level	Displays a warning message and shuts down automatically.
Charge	Charged by the AC adapter when the main unit power is OFF.
Charge time	Approx. 8 hours (power OFF)

〈Outer Dimensions〉

Soft Carrying Case CC-0025

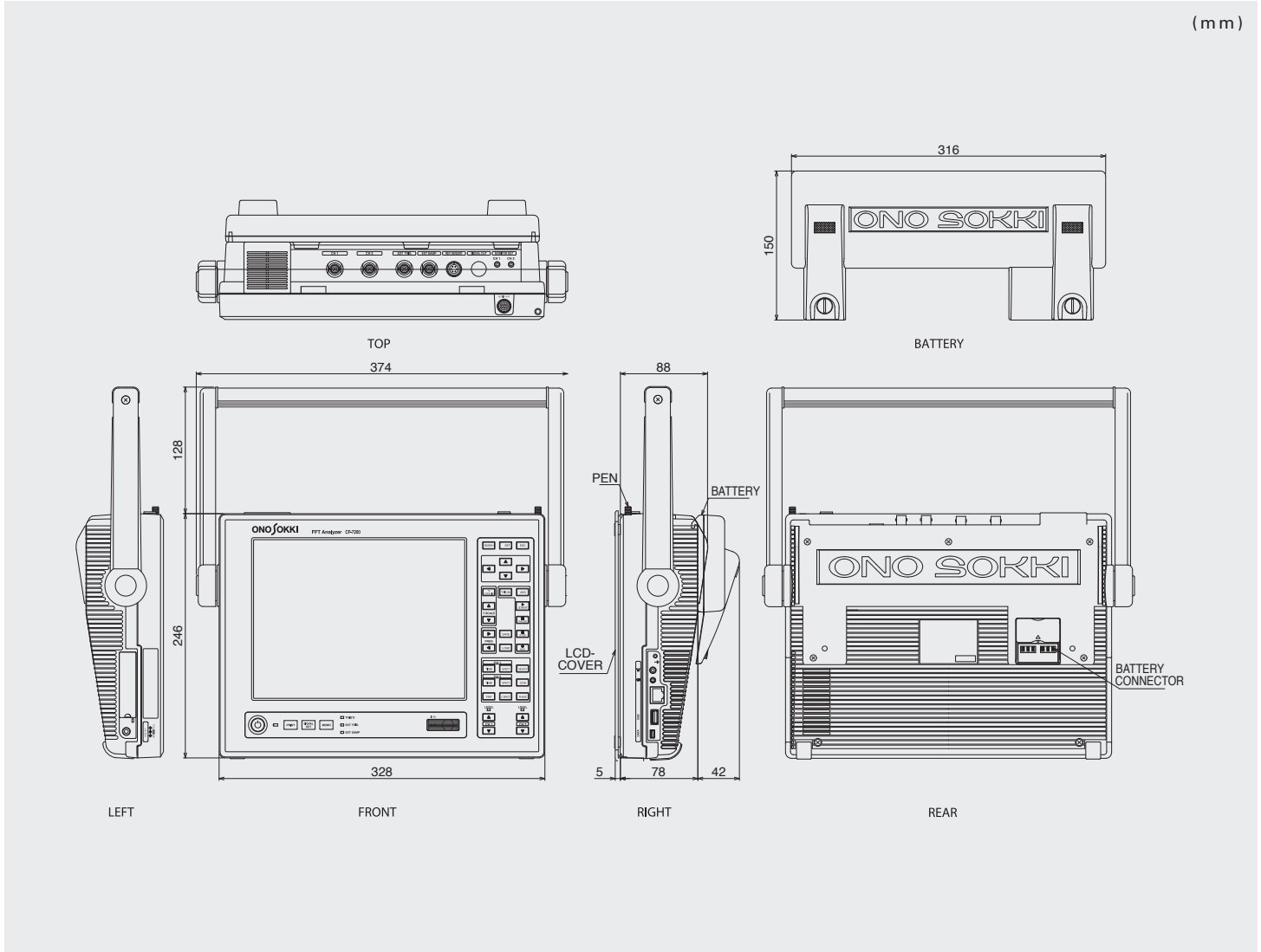


Hard Carrying Case CC-0071A



<Outer Dimensions>

Main Unit CF-7200A



<Main Unit >

Model Name	Product Name
CF-7200A	Portable 2channel FFT Analyzer

<Standard Accessories>

Model Name	Product Name
CF-0792	Battery Pack
CF-0701	Panel Protection Cover
CF-0702	Stylus Pen
CF-0703	USB Connection Cable
—	AC Adapter
—	USB memory (for update)
—	CF card (512 MB)
—	Instruction manual(User guide, Reference guide:CD)

<Options>

Model Name	Product Name
CF-0722*	Tracking Analysis Function (Order Ratio Analysis Function)
CF-0771*	1ch Signal Output Module
CF-0701	Panel Protection Cover
CF-0702	Stylus Pen
CF-0703	USB Connection Cable
CF-0704	CF card (512 MB)
CF-0705	CF card (2 GB)
CF-0706	CF card (4 GB)
CF-0792	Battery Pack
CC-0025	Soft Carrying Case
CC-0071A	Hard Carrying Case

Model Name	Product Name
DS-0295	Remote Controller
—	AC Adapter
—	Cable for an AC Adapter
made to order	Battery charger for the CF-0792
made to order	Rack Mount Adapter

* Modification by Ono Sokki is required when adding options after purchase.

<Recommended Products>

Model Name	Product Name	Manufacturer
BL-112UI	Thermal printer	Sanei Electric Inc.
HM-186	Speaker microphone	Icom Inc.



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