CF-9000

CE

FFT Analyzer

Portable 2-channel / 4-channel

FFT Analyzer

CF-9000 Series

Innovative features in a tough body

ONO SOKKI

The right tool for quickly making decisions and A reliable partner that accepts no compromise.

Portable FFT analyzer

CF-9200

[For 2-channel analysis]

CF-9400

[For 4-channel analysis]

Speedy

Keys and a touch panel for quick, light and intuitive operation

With the CF-9200/9400, basic FFT analysis operations such as display, measurement, stopping, recording and readout can be made positively and quickly through the large hard keys. The touch panel provides an intuitive interface, allowing the operator to easily perform speedy and reliable operations by a swipe or tap with fingers on the screen, such as selecting the number of waveforms displayed and scaling of the X and Y axes to the desired scale.

CF-9400 CF-9200

Flexible

5 hours*1 of continuous cordless operation. Replacement of batteries while powered on

The CF-9200/9400 includes the two on-board, large capacity lithium ion secondary batteries which enable continuous cordless operation of 5 hours*1. The hot swap feature which allows battery replacement while it is power-on enables continuous measurement operation of analysis and recording without interruption. The built-in battery in the main unit can also be charged while in operation.*2

*1 CF-9400 4ch, when CCLD is ON.
*2 Full recharge takes 8 to 9 hours (depending on the usage conditions) with the power on, and 4.5 to 5 hours with the power off (at operating environment 20 C°).

taking action.

The CF-9200/CF-9400 is an all-in-one portable FFT analyzer. All FFT analysis operations can be performed with the integrated hard keys and capacitance type touch panel without requiring a PC.

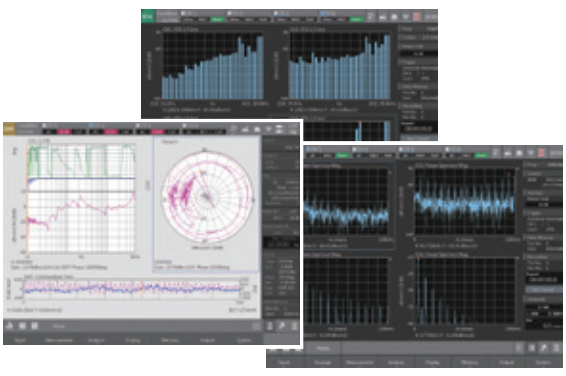
Newly developed exclusive 100 kHz high-performance analysis front-end system incorporating 24-bit A/D converter analyzes sound and vibration of a piping/pump in a factory plant, motor, automobile, railway vehicle, mechanical instruments including home electrical appliances, and electrical /electronic parts.
The CF-9200/9400 help to find solutions for field workers in their FFT analysis including the resonance and frequency characteristics of mechanical structures by using an electromagnetic exciter or an impulse hammer.

Versatile

FFT, RTA, excitation control & simultaneous recording

The CF-9000 series are compact and versatile to carry out various operations including linear/log, sweep analysis using signal output, amplitude control of electromagnetic exciter*3, as well as FFT Analysis, real-time octave analysis*1, and rotation tracking analysis*2.
It can also perform simultaneous analysis and recording operations, allowing offline analysis by CF-9200/9400 main unit and software applications*4.

*1 Real-time Octave Analysis (RTA) (CF-0923) is required.
*2 Tracking Analysis (CF-0922) is required.
*3 Log Sweep/Excitation Control (CF-0942) is required.
*4 Please refer to P.10, 11 for details.

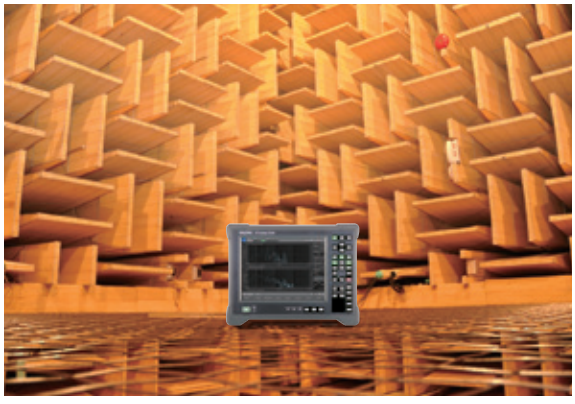


Quiet

Silent and non-vibration by fan-less & spindle-less structure

Fan-less and spindle-less structure prevents occurrence of mechanical sound and vibration. The CF-9200/9400 itself does not become the cause of sound and vibration, and not disturb measurement and recording in a field. By installing wireless LAN adapter, you can operate remotely* without touching the main body of the CF-9200/9400.

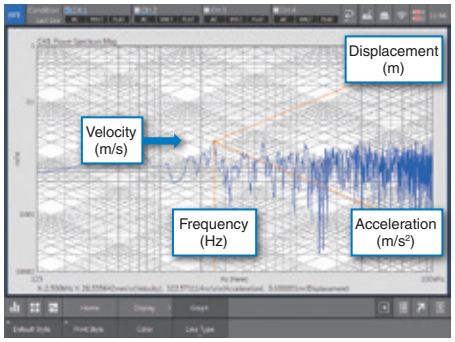
*When Microsoft® Remote Desktop is used.



Dynamic and Steady
Various function designed through accumulated

Real-time tripartite graph display / Vibration criterion curves

The CF-9200/9400 are equipped with real-time tripartite graph*1 display as a new standard 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.
By processing 1/3 octave and displaying VC curves*2 (Vibration Criterion Curves), allowable vibration reference or setting environment evaluation of vibration sensitive instrument, such as AFM, electronic microscope, and Laser interferometer is able to be judged quickly.
You do not need to operate differential and integral processing individually by using the frequency analysis function and conversion of amplitude values as before. Therefore, this function enables you to read three amplitude values quickly.

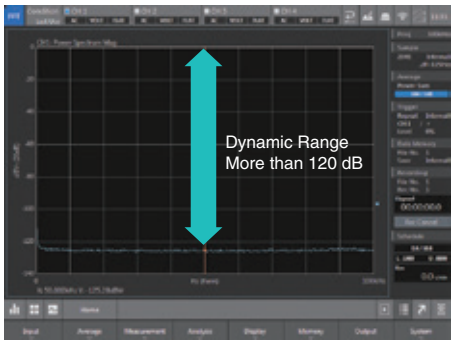


*1 The tripartite graph (diagram) enables you to read amplitude values of acceleration (m/s²) and displacement (m) which is based on velocity (m/s), on the frequency (Hz) axis.

*2 VC Curve is proposed as a guide of allowable small vibration for setting precise machinery. Evaluation in 1/3 octave band width when VC Curve is used. It is divided in total 5 stages at an interval of 6 dB (VC-A, VC-B, VC-C, VC-D and VC-E) by the aim of usage for various instruments such as light microscope or laser equipment with long light path.

Wide dynamic range

The CF-9200/9400 feature a new 24-bit A/D front-end system, offering more than 120 dB wide dynamic range. Changing voltage range due to A/D over is not required by this function anymore, which had been frequently performed in general acoustic or vibration measurement.
Wide dynamic range allows more efficient measurement and data recording, easier to operate even for novices.



Isolated all inputs

All signal input channels are isolated (insulated). With high resistance to ground loops and super imposed noise, the main unit offers highly reliable measuring performance even in locations which is prone to potential difference. The isolation scheme also protects the crucial areas of the FFT system from sensors or signals that can be exposed to harmful transient voltages.


CF-9200


CF-9400

Equipped with CCLD*1, applicable to TEDS*2

Each channel of the CF-9200/9400 is equipped with CCLD (power supply for sensors) which can directly drive an accelerometer with built-in preamplifier, a charge converter for charge output type accelerometer, and a measurement microphone. TEDS reads data retained in a TEDS sensor and allows supplying the power to the sensor and performing the unit calibration automatically.

*1 **What is CCLD (Constant Current Line Drive)?**
It means a sensor interface using constant current supply. CCLD for an accelerometer with built-in preamplifier or a microphone preamplifier enables direct connection to an FFT Analyzer without using external amplifier. 2 to 4 mA of CCLD is commonly used.

*2 **What is TEDS (Transducer Electronic Data Sheet)?**
It is a standardized method which describes the information relevant to a measurement sensor. It is defined in the IEEE 1451 series.
As information of a TEDS sensor is automatically read to the TEDS available measurement devices, the user is ready to take measurements. It can avoid setting error and also saves you time and effort of troubling calibration and measurement preparation.

CF-9400

CF-9200

technology on CF-9200 / 9400

Easy operation through a touch panel interface

The CF-9200/9400 employ a 10.4 LCD capacitance type touch panel, allowing the operator to tap and swipe graphs. The band or gain which you have selected can be widened or narrowed with a simple and intuitive action. Only a simple gesture (finger movement) operation is needed to perform the following functions; fitting waveform amplitude to the graph scale, changing positions of waveform graphs, scaling of time axis and frequency axis, offsetting of waveform, and graph span adjustment.

Reliable inputs with large hard keys

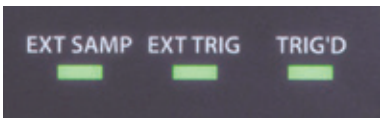
Operations such as turning the power on and off, changing data types and saving data are carried out using the new large hard keys. An excellent operational feeling of these keys assists fast and correct input even in unstable or narrow space and prevents data missing or malfunction.
Lock function (HOLD) for hard keys and touch panel are equipped in order to prevent unintended inputs and setting changes.

Channel and waveform selection (CF-9400)

Basic operations

Highly visible LED indicators

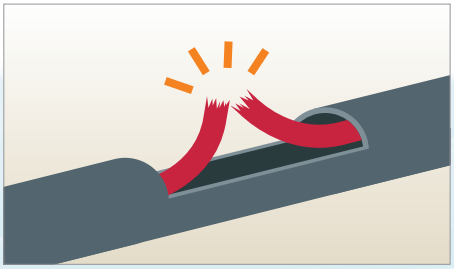
Statuses of major FFT operations are shown by LED indicators. The hard keys for major functions also have LED indicators. This enables the operator to monitor operating state of FFT, such as the power-up process, the charging state of the secondary batteries, and the excessive input to an A/D converter even from a distance.



Cable disconnection detecting function

When cable disconnection detecting function is on, the CF-9200/9400 automatically detects cable disconnection or connector trouble of an accelerometer and a microphone*, preventing trouble before measurement.

* Microphone with a built-in constant current line drive (CCLD) type preamplifier.



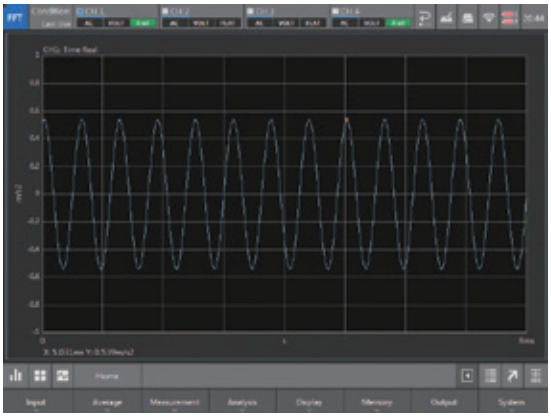
From the laboratory to the field, real-time waveform and simultaneous waveform recording are achieved

CF-9200 / 9400

FFT Basic Analysis Function

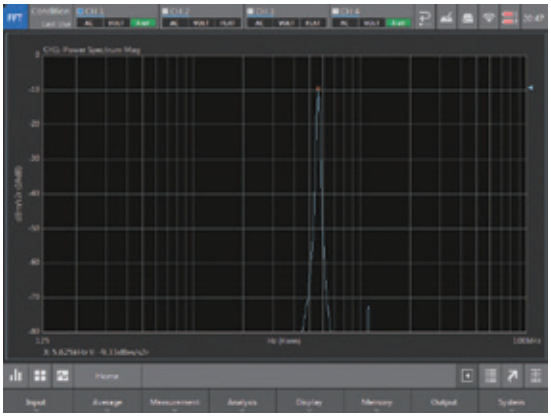
Time-axis Waveform

Performs A/D conversion of the voltage signal of vibration, noise, distortion, current probe, etc. coming from a sensor and 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. The time-axis data statistical processing function enables quantitative time waveform analysis and diagnosis of such items as mean value (MEAN), root mean squared value (RMS) and crest factor.



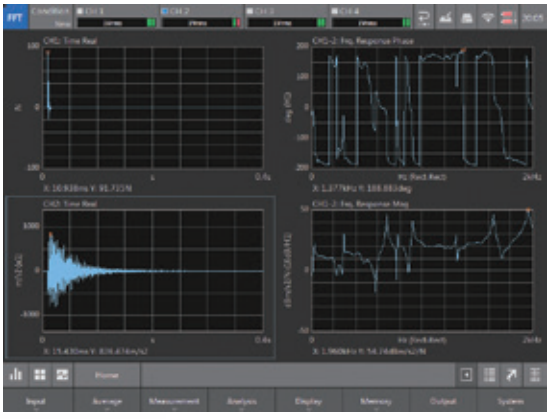
Power Spectrum

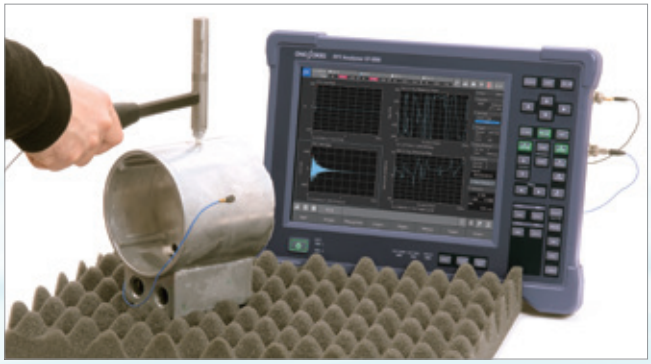
The power spectrum shows the magnitude of each frequency component included in the time-axis waveform, which has been obtained with the FFT Analyzer, in the form of graph with the frequency on the horizontal axis by calculating the power of each frequency band (frequency resolution △f).
Power spectrum analysis enables detection of abnormal conditions of a facility, which are difficult to be estimated through measurement of vibration, noise level, and observation of time waveform. The natural frequency of a structure can also be measured.



Frequency Response Function

The frequency response function (FRF), in a mechanical system or an electrical circuit system, shows the input-to-output ratio as gain and phase characteristics on the axis representing frequency. The gain characteristics indicate how the amplitude of input signals changes as they pass through the transfer system being evaluated. The ratio of the output amplitude to the input amplitude is plotted on the Y-axis. The phase characteristics indicate phase advance/delay between the input and output signals with the Y-axis plotted in degrees or radians.





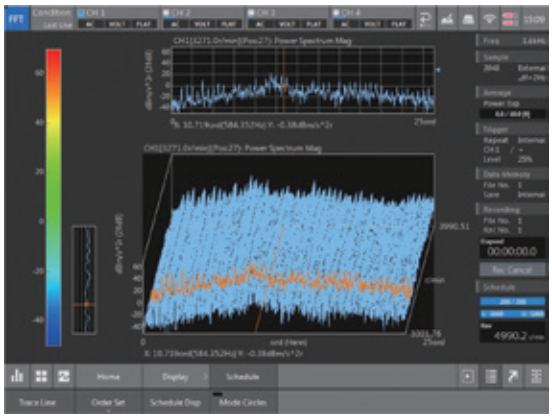
measurement / analysis with just one unit.

CF-9200 / 9400

Optional Software for Analysis

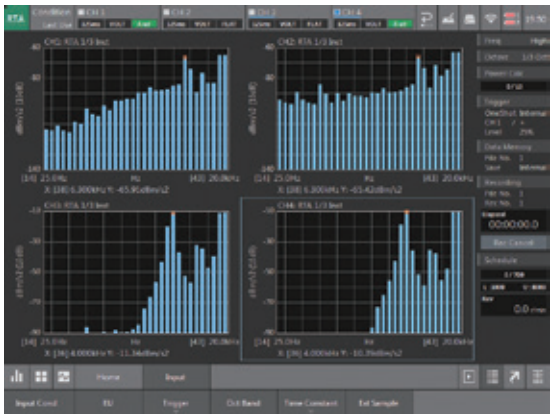
Tracking Analysis (CF-0922)

CF-0922 Tracking analysis function automatically stores FFT values during calculating the vibration or noise which has occurred when rotating with wide variation speed, and analyzes the physical phenomena with reference to the rotation speed, such as vibration and noise changing with speed.
Since machines (rotary machine) turning at their axes including an engine, a gearbox turbine, and a motor turn in wide range of rotation speed from low to high, they may produce large vibration and noise by the resonance of component parts at specific rotation speed. To reduce the risk of destruction and to increase quietness, it is necessary to evaluate the relationship of natural vibration frequency between rotation speed and component parts.
By using the CF-0922 Tracking Analysis software, you can see and analyze the relationship between rotation speed and physical phenomena at specific rotation speed range in various expressions such as color map, 3D graph, and order components on the basis of one rotation.



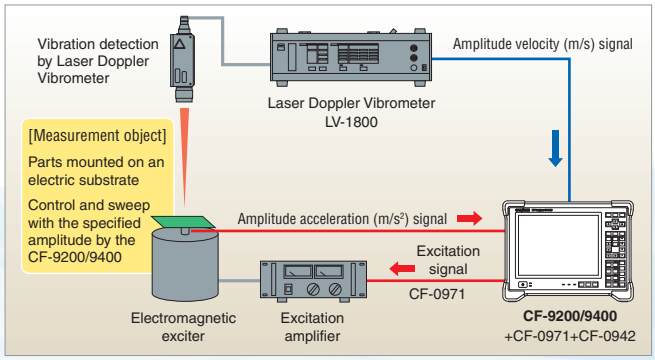
Real-time Octave Analysis (RTA) (CF-0923)

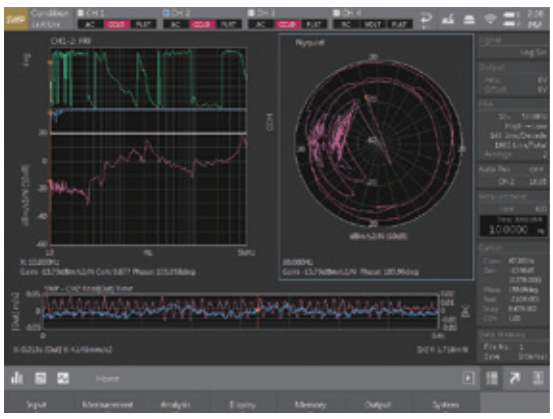
The highest note of an octave has twice the frequency of the octave's lowest note. As the feeling of human hearing has characteristics in equal ratio to frequencies, the Real-time Octave Analysis (RTA) software (CF-0923) is an effective tool for noise analysis. The sound pressure level of every band can be obtained through band-pass filter which is defined by standard of 1/1 or 1/3 octave in the noise frequency range to be measured.



Log Sweep / Excitation Control (CF-0942)

The Log Sweep function is used to evaluate the resonance points of a transfer system by continuously changing the frequency of the driving sine waves from the 1ch Signal Output Module (CF-0971). By sine-sweeping the frequency axis with a logarithmic scale, it is possible to obtain the gain and phase for each single frequency and an accurate response function with a high S/N ratio. The Excitation Control limits the amplitude of an electromagnetic exciter to a desired range, enabling vibration testing without considering the frequency characteristics of the exciter.





* 1 ch Signal Output Module (CF-0971) is required for this software.

System Configurations

From detection to processing, analysis, and graph creation. The CF-9200/9400 are supported by a wide range of peripherals including sensors for excitation, sound, vibration and rotation.

Vibration

Laser Doppler Vibrometer/Laser Doppler Velocity Meter
LV Series

LV-1800

Accelerometer with Built-in Preamplifier
NP-3000 Series

Signal Cable
NP-0120/0130/0150/0170 Series

Miniature/BNC Conversion Adapter
NP-0021

Charge Output Accelerometer
NP-2000 Series

Signal Cable
NP-0120/0130/0150/0160 Series

Charge Converter
CH-6130/6140

Charge Amplifier
CH-1200A

Tri-axial Accelerometer with Built-in Preamplifier
NP-3500 Series

Signal Cable for Tri-axial Accelerometer
NP-0232/0262

Impulse Hammer
GK Series

GK-2110/3100/4110G10

Applicable cable/Conversion adapter

Sound

Sound Level Meter
LA Series

Signal Cable
AX-501

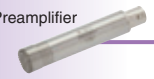
2.5ϕsub-mini plug — BNC connector

1/4-inch Measurement Microphone
MI-1531
+
Microphone Preamplifier
MI-3140

Signal cable
NP-0130 Series

Miniature/
BNC Conversion Adapter
NP-0021

1/2-inch Measurement Microphone
MI-1235/1433
+
Microphone Preamplifier
MI-3111



Signal cable
AG-2000 Series

BNC Conversion Plug
(BNC-A-PP)

Rotation

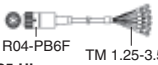
Optical Detector
LG-9200

Signal Cable
MX-7100 Series

Digital Tachometer
TM-3100 Series

Signal Cable
MX-603+MX-100 Series

Magneto-electric Rotation Detector
MP-981/9820



R04-PB6F — TM 1.25-3.5S
D5-UL
(Composite 5-core vinyl sheath cable)

TM 1.25-3.5S — BNC jack
P-2
(2-core outer shielded cable)

Optical Fiber Sensor
FS-540/5500
+
Fiber Optic Sensor Amplifier
FG-1300

Handheld Digital Tachometer
HT-5500

Signal Cable
AX-501

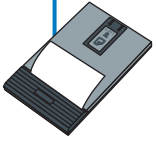
2.5ϕsub-mini plug — BNC connector

Portable 4-channel FFT Analyzer
CF-9400

Portable 2-channel FFT Analyzer
CF-9200

BNC cable
(MX-100 Series)

USB



Mobile printer
MW-260 Type A
Brother Industries, Ltd.

Memory & Interface

CF-9200/9400 have wide variety of memory mediums and interfaces including wire/wireless, such as SSD (Solid State Drive) and SD/SDHC memory card. You can choose a suitable one according to the field or office environment.

MEMORY

SSD (Built-in CF-9200/9400)

SSD built-in the CF-9200/9400 can record and read waveforms, analysis data, waveform image, setting condition, and digital recording data. An SSD is less affected from noise and vibration because this medium does not have drive section which produces noise and vibration.

SD/SDHC Memory Card

The CF-9200/9400 have a memory card slot(×1) for SD/SDHC. Waveforms, analysis data, waveform images, setting conditions, and digital recording data can be recorded and read via an SD/SDHC memory card. Data which was recorded in a built-in SSD is copied and transferred easily into an SD card or a USB memory card.

USB memory

The CF-9200/9400 have USB A terminals (×3). Waveforms, analysis data, waveform images, setting conditions, and digital recording data can be recorded and read via a USB memory. Data transfer and copy of data which has been stored in a built-in SSD are easy, such as data transfer/copy to a USB memory.

* Not all types of USB memory are guaranteed for the operation. Encripted USB memory cannot be used.

INTERFACE

USB mass storage class function

You can directly access the FFT measurement data and recorded data (ORF) which have been stored in a built-in SSD of the CF-9200/9400 by a Windows® -based PC.
It is easy to copy the stored data in the CF series to a PC.

PC environment conditions for connection
Windows®7 (32 bit, 64 bit), Windows®10 (32 bit, 64 bit)

LAN Connection function Partly Option

Connecting the CF-9200/9400 to Windows®-based PC with LAN cable provides various operations as below.
・Copying and saving measurement data
・Operation remotely from a PC side using Remote Desktop Function*1
・Projecting the screen of the CF-9200/9400 by a projector
・Controlling the CF-9200/9400 by program (CF-0947: LAN external control function (option) is required.)

PC environment conditions for connection
Windows®7 (32 bit, 64 bit), Windows®10 (32 bit, 64 bit)

Wireless LAN connection function Option

Mounting wireless LAN adapter*2 allows remote control*1 of the CF-9200/9400 including screen display etc. by Windows®-based PC or mobile information terminal.

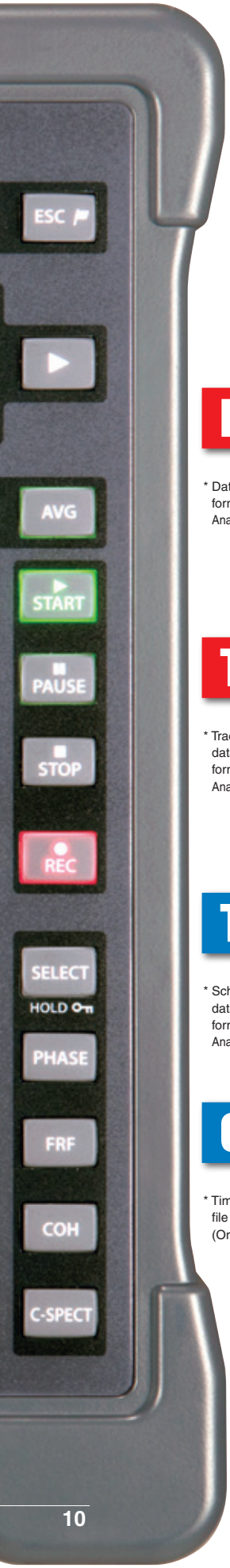
Bluetooth® connection function Option

Mounting Bluetooth® receiver*2 enables wireless output of graph displaying screen to a mobile printer*2 by PRINT button operation. A keyboard can also be connected wirelessly.

*1 Microsoft® Remote Desktop is used. *2 Please use the recommended product by Ono Sokki.

CF-9200/9400 × O Series

O series software is useful for secondary processing for the data recorded by the CF-9200/9400.
By import and browse of the data, O series software helps smooth data organization, processing, analysis and graph creation.



OC-1300 Series Toolbox

The OC-1300 Toolbox software system supports organization and graph creation of the data which has been obtained by FFT Analyzer. Two kinds of software tool support visualization of the obtained data.

DAT

* Data file (binary format) of FFT Analyzer (Ono Sokki)

TRC

* Tracking Analysis data file (binary format) of FFT Analyzer (Ono Sokki)

■ CF-9200/9400
Data file corresponding

DAT Browser

Time domain waveform, power spectrum, bundled octave, Fourier spectrum (Real, Imag, Mag, Phase), frequency response function (Real, Imag, Mag, Phase), coherence, tracking, RTA (1/1, 1/3)

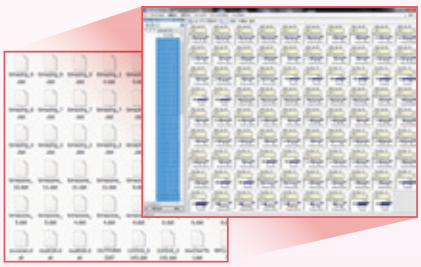
TRC Browser

Constant width (time, revolution), constant ratio (time, revolution), RTA (1/1, 1/3 (time, revolution))

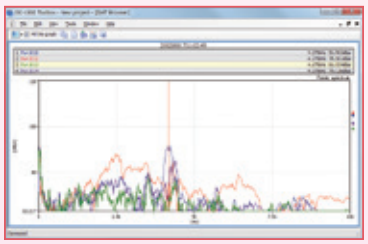
DAT Browser OC-0340

DAT Browser can collectively read more than 100 of FFT data (DAT) which have been stored in the CF-9200/9400 or a PC, and create graph. It also allows data selection, differential and integral calculi, overdrawing, output to the OC-1300 series, image output as BMP or metafile format.

●Graph creation of stored data up to 100 at once



●Example of overlapping graph. Order lines can also be overlapped.



OS-2000 Series

Time-series Data Analysis Tool

TLD

* Schedule diagram data file (binary format) of FFT Analyzer (Ono Sokki)

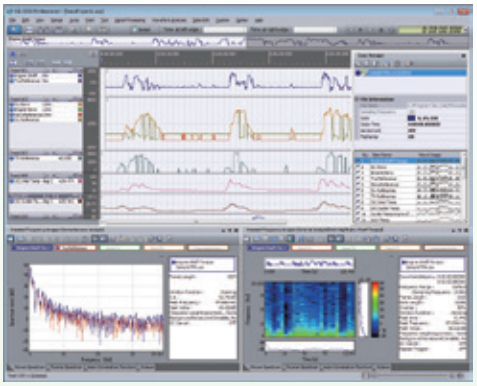
ORF

* Time domain record file of FFT Analyzer (Ono Sokki)

The OS-2000 series can freely edit, process, and analyze time-series data recorded by the CF-9200/9400. This software enables advanced data processing and analysis such as calculus processing of time series data recorded, playback of recorded data, filter processing, sound fluctuation analysis etc.

The OS-2000 series allows to edit and analyze long time-series data freely that is not able to be handled by Microsoft® Excel®. Various data formats of recorder made by other company are able to be used as well as general formats including CSV and WAVE. Simultaneous display, side-by-side display, and overlapping display are enabled without restriction of data format or sampling frequency.

●Main Screen



OS-2000 series Product list

Model name	Product name
OS-2500	Basic
OS-2600	Standard
OS-2700	Professional
OS-2720	FFT Analysis package
OS-2740	Sound Quality Evaluation package
OS-2760	Fluctuation Sound Analysis package
OS-0251	Statistical Analysis
OS-0252	FFT Analysis
OS-0253	FIR filter
OS-0261	IIR filter
OS-0263	Time Frequency Analysis
OS-0264	1/N Octave Analysis
OS-0265	Traking Analysis
OS-0271	Sound Quality Evaluation Analysis
OS-0272	Fluctuation Sound Analysis
OS-0273	Fluctuation Sound Simulator
OS-0281	Video Playback

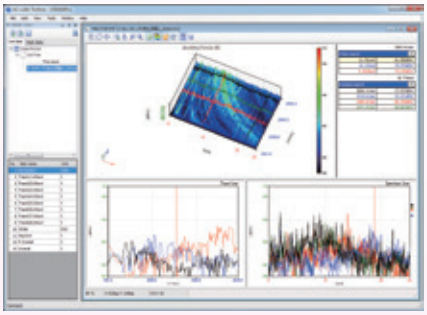
* Please refer to each brochure for the OS-1300 series and OS-2000 series for more details.

High performance software supports various analysis

CF-9200/9400 record simply, analyze smoothly.

TRC Browser OC-0341

TRC Browser is software to create graphs from the tracking data stored in the CF-9200/9400 or a PC. TRC Browser can import multiple tracking data files and create graphs with multiple windows.



OC-1300 Toolbox Product list

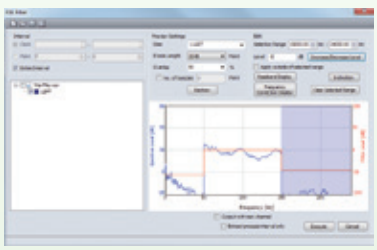
Model name	Product name
OC-1340	DAT・TRC Browser package*1
OC-0320	Digital map*2
OC-0330	Cube controller*2
OC-0340	DAT Browser*2
OC-0341	TRC Browser*2

*1 OC-1340 includes OC-0340 and OC-0341.
*2 OC-0320, 0330, 0340, 0341 are able to be used singly.

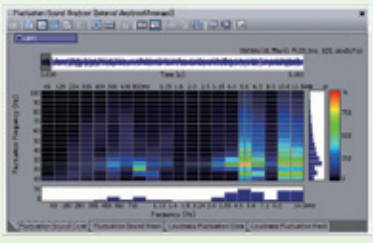
EXPORT

●Traking Analysis

●FIR filter



●Fluctuation sound analysis

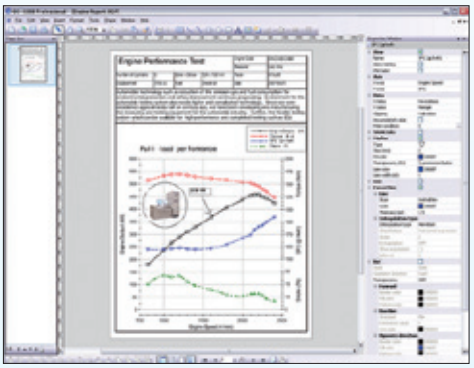


OC-1300 Series

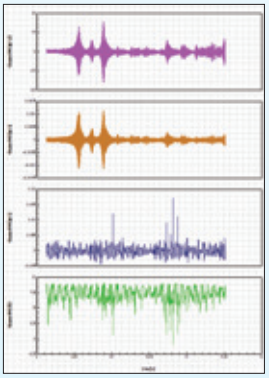
Graph Creation Tool

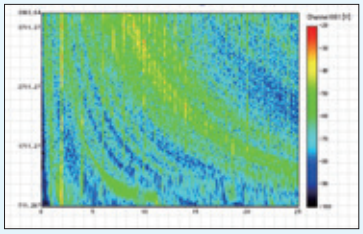
The OC-1300 series is software that anyone can make a beautiful graph easily, quickly, and smoothly. You can design a graph layout freely by dragging the axis with a mouse.
A complicated multi-axis graph that is difficult to be created by spread sheet software is able to be created easily.

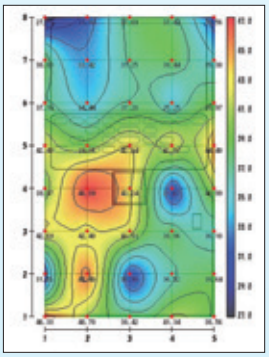
Graphs which have been created in the OC-1300 Toolbox or the OC-2000 series are easily exported to the OC-1300 series by one-click operation. You can create a visually appealing graph by writing marker value in the waveform and pasting a photo image on the graph.



EXPORT







Sound pressure which is emitted from the machines is expressed smoothly in a contour map by the OC-1300 series.
For further analysis, you can acquire concrete image of the result by superposing a contour map with the exported photo image etc. Specifying the transparence of the contour map allows you to see them clearly.

OC-1300 series Product list

Model name	Product name
OC-1310	Basic
OC-1320	Standard
OC-1330	Professional
OC-0310	Control API

1. Input Section

Number of input channels (CF-9200)	2	
Number of input channels (CF-9400)	4	
Input connector	BNC (Type C02)	
Input configuration	Single-ended	
Isolation	Isolated between each channel (permanently)	
Input impedance	1 MΩ±0.5 %, 100 pF or less	
Input coupling	DC or AC (0.5 Hz -3 dB±10 %)	
Power supply for sensor (CCLD)	+24 V/4 mA	
Cable disconnection detecting function	Automatically detects cable disconnection when using CCLD	
TEDS function	Accepts IEEE1451.4 Template ver. 0.9 / 1.0*1 based accelerometer, microphone and force sensor	
Absolute maximum input voltage	70 Vrms AC for 1 minute (50 Hz)	
Input voltage range	1 Vrms, 31.62 Vrms (2 ranges)	
DC offset	-60 dB F.S. or less (When auto zero is on.)	
Input level monitor	Lights up in red LED at excessive input. (Lights up in red for a range F.S.)	
Frequency range	DC to 100 kHz	
A/D converter	24 bits type ΔΣ	
Dynamic range	120 dB or more (at FFT frame length 4096 points or more at 1 kHz or more)	
Amplitude flatness	Less than 20 kHz	±0.1 dB
	20 kHz or more	±0.2 dB
Harmonic distortion	Less than 20 kHz	-80 dB
	20 kHz or more	-75 dB
Aliasing	-80 dB or less	
Full-scale accuracy	±0.1 dB or less (at 1 kHz)	
Amplitude linearity	±0.0015 % (at full scale)	
Channel to channel cross-talk	-100 dB or less (at 1 kHz)	
Channel to channel gain accuracy	Less than 20 kHz	±0.05 dB
	20 kHz or more (measured in the same voltage range)	±0.1 dB
Channel to channel phase accuracy	Less than 20 kHz	±0.3 deg
	20 kHz or more	±0.7 deg
Anti-aliasing filter	4th order Butterworth: LPF 450 kHz -3 dB	
Digital filter	FFT aliasing filter	At baseband: 10th order ellipse
		At zooming: 6th order ellipse
	Real-time octave band	6th order Butterworth
	Filter	IEC 61260 Ed. 1.0 class 1
	Frequency weighting filter	A and C frequency weightings
		IEC 61672-1 Ed. 1.0 class 1
		ANSI S1.4-1983 TYPE 1
		JIS C1509-1: 2005 class 1
External sampling input	Input connector	BNC (Type C02)
	Input voltage range	±12 V
	Input impedance	100 kΩ
	Input coupling	DC or AC
	Detection level	-12 V to +12 V step 0.025 V
	Slope	+ (Rising) or - (Falling)
	Hysteresis level	Optional setting (default 0. 5V, range 0.025 V to 24 V)
	Input frequency range	0 to 300 kHz (out-of-band filter 300 kHz -3 dB)
	Absolute maximum input voltage	30 VAC/30 VDC
	Number of input pulses/rotations	0.5 to 1024 P/R
	Input pulse frequency divider function	1 to 1024 dividing, step 1
		It is necessary when input frequency is over 4 kHz.
	Waveform monitor	Waveforms can be checked on the screen.
	External sampling input LED	Green LED (EXT SAMP) lights when pulse is detected.
External trigger input	Input connector	BNC (Type C02)
	Input voltage range	±12 V
	Input impedance	100 kΩ
	Input coupling	DC or AC
	Detection level	-12 V to +12 V step 0.025 V
	Slope	+ (Rising) or - (Falling)
	Hysteresis level	Optional setting (default 0. 5 V, range 0.025 V to 24 V)
	Input frequency range	0 to 300 kHz (out-of-band filter 300 kHz -3 dB)
	Absolute maximum input voltage	30 VAC/30 VDC
	Waveform monitor	Waveforms can be checked on the screen.
	External trigger input LED	Green LED (EXT TRIG) lights when pulse is detected.

*1 TEDS information may not be read depending on the type of the TEDS tip included in a sensor. Please consult your nearest distributor or Ono Sokki sales office nearby.

2. Display Unit

Size	10.4-inch
Resolution	800 × 600 dots*
Method	TFT color LCD with capacitance type touch panel
Brightness adjustment	2 levels (bright/dark)
Lighting (Back light)	LED

* The ratio of the number of effective dots: 99.999 % or more.

· The TFT color LCD is created by the full use of advanced technology. However, the pixels (dots) of non-lighting or always lighting occasionally exist in the display. (The ratio of the number of effective dots: 99.999 % or more of 800 x 600 dots.) Also, unevenness of the color or brightness may be visible depending on the viewing angle or the temperature change. This is not a product failure, so please note that return or exchange of the product cannot be accepted.

3. Operation Section

Power switch	Power ON: Press and hold the switch more than 1 second	Power OFF: For turning off, press and hold the switch for a second or more, and after beep sound, release your finger. When the switch is pressed continuously, the power is forcibly OFF.
Operation keys (Soft keys)	Detailed settings for each function can be performed by soft keys lower on the LCD display	
Operation keys (Direct keys)	Cursor & selector key	Right and left, up and down, SEARCH, ◿SET, ESC
	Switches of measurement	SCHED, TRIG ON, AVG, START, STOP etc.
	Waveform selector	TIME, SPECT, PHASE, FRF, COH, C-SPECT, SELECT
	Misoperation preventing function	Press and hold SELECT to lock, unlock the soft key & direct key (excluding power switch).
	Printing key	PRINT: Enables direct print of the screen displayed while connecting the recommended printer.
	Auto sequence play key	AUTO SEQ: Reproduces the registered continuous operation content
	Frequency range selector key	FREQ right and left
	Y-axis scale selector key	Y SCALE up and down
	Signal output ON/OFF	SIGNAL OUT (Available when the CF-0971 option is installed.)

4. Analysis Section

Frequency range	100 mHz to 100 kHz	
Frequency accuracy	±0.005 % (±50 ppm) of the reading values	
Sampling frequency	Frequency range × 2.56 (Internal sampling)	
Number of sampling points / analysis points	Number of Sampling points	Number of Analysis points
	256	100
	512	200
	1024	400
	2048	800
	4096	1600
	8192	3200
	16384	6400
Overlap processing	MAX/66.7 %/50 %/0 %/ optional setup	
Window function	Rectangular/Hanning/flat-top/force/exponential/user-defined	
Delay function	With reference to channel 1, time frame of other channels can be delayed by 0 to 8191 points.	
Time waveform processing function	First and second order differentials/single and double integrals, absolute value conversion/DC cancel/trend elimination/smoothing	
FFT real-time rate	100 kHz/4ch (Internal sampling, FFT frame length 2048 points or less)	
Averaging function	Number of averaging setup: 1 to 65535 times	
	Averaging setup time: 0.1 to 999.9 seconds	
	*Averaging can be stopped in terms of the number of times or time	
	Time domain	Summation average / exponential average
	Frequency domain	Summation average / exponential average / peak hold / subtraction average Sweep average / Fourier average / Max OA
	Amplitude domain	Summation average
	A/D-over cancel / double hammer cancel / averaging undo function	
Trigger function	Green LED (TRIG'D) blinks when triggered	
	Trigger level	-99 to 99 (Unit: %) Default: 25 % Threshold value can be set by amplitude unit (including user calibration value).
	Hysteresis level	0 to 99 (Unit: %) Default: 2 %
	Position	±16383
	Mode	Free/repeat/single/one-shot
	Source	Ch1/Ch2 (CF-9200) to Ch3/Ch4 (CF-9400)/ external trigger input
	Slope	+/−/± (Internal trigger) +/− (External trigger)
FFT calculation	32-bit floating point (IEEE single-precision format)	

5. Processing Functions

Time domain	Time waveform/auto-correlation function/cross-correlation function/ impulse response/cepstrum
Amplitude domain	Amplitude probability density function/amplitude probability distribution function
Frequency domain	Power spectrum/Tripatite graph*/Fourier spectrum/liftered spectrum/ cross spectrum/frequency response function/coherence function/ coherence output power
Calculation function (Time-axis statistical processing)	Mean value/absolute mean value/rms value/standard deviation/ maximum value/minimum value/crest factor/skewness/kurtosis

* 1/3 oct VC Curves: Display is selectable from VC-A to VC-E. 1/3 oct: Bundled octave processing.

6. Memory Functions

Recording device	Selectable from internal storage in main unit or SD/SDHC card	
Recording function	Frequency range	100 kHz (max.)
	Recording channel	Ch1/Ch2 (CF-9200), Ch1 to Ch4 (CF-9400) Also rotation information recording is possible.
	Recording time	Approx. 32 min. (At 50 kHz range 4ch recording, rotation information OFF, (max. 4 GB))
	Marker	Pressing [ESC] during recording allows marking.
	Recording format	ORF
	Maximum recording capacity	Internal storage approx. 6 GB SDHC memory card (32 GB max.)
Data file	9990 (999 data × 10 blocks) data	
	DAT/TXT/BMP (Data can be saved simultaneously in three formats. (TXT and BMP selectable))	
Panel condition memory	Memorizes and recalls measurement conditions. (50 types max.)	
Handwritten memo memory	Hand written memo on the touch panel can be recorded.	

7. Interface

USB	Number of ports	3 (Type A)
	USB	USB 2.0 memory, wireless LAN module, Bluetooth® module
DATA	Number of ports	1 (Type mini B)
	DATA	USB 2.0, for USB mass storage class function Data in the main unit is read by connecting to a PC. (Not writable)
Wireless connection	Wireless LAN module	Recommended product made by Logitec. Corp.
	Bluetooth® module	Recommended product made by Buffalo. Inc.
SD card slot	Number of slots	1
	Capacity for SD/SDHC	4 GB to 32 GB*
LAN	Number of ports	1
	10BASE/100BASE-TX/ 1000BASE-T	Remote Desktop, external control
Printer output	Print by PRINT key of the main unit	
	Interface	USB or Bluetooth® (When Bluetooth® module mounted)
	Applicable printer	MW-260 Type A Brother Industries, Ltd.
	Output data	Screenshot/list display copy

* Not guaranteed all types of SD, SDHC card.

8. Other Function

Condition view	List display of specified conditions
Clock	Year, month, and date in western calendar Hour, minute, and second display
Operation sound/ alarm sound	Can be specified ON/OFF

9. General Specification

Power supply	AC adapter or batteries (Both provided as standard)	
Power consumption	CF-9400 (When the CF-0971 Signal Output option is installed.)	87 VA or less (When AC adapter is used, not battery charging)
		150 VA or less (AC adapter is used, battery charging)
	CF-9200 (When the CF-0971 Signal Output option is installed.)	73 VA or less (AC adapter is used, not battery charging)
		150 VA or less (AC adapter is used, battery charging)
Operating temperature range	0 to +40 ˚C (Humidity 20 to 80 % RH, with no condensation)	
Storage temperature range	-10 to +50 ˚C (Including lithium ion secondary batteries) (Humidity 20 to 80 % RH, with no condensation)	
Functional ground terminal	Grounding terminal for noise elimination (M3, binding head screw M3×L6 recommended)	
Outer dimensions	Smaller than 333(W)×248(H)×112(D) mm *Not including handle, stand or protruded sections.	
Main unit cooling	Naturally air-cooling (Fanless)	
Weight	Without batteries: Approx. 3.9 kg	
	With two batteries: Approx. 4.9 kg	
CE marking	Applicable Low Voltage Directive: 2014/35/EU EN61010-1 EMC Directive: 2014/30/EU EN61326-1 RoHS Directive: 2011/65/EU EN50581	
Vibration resistance	9.8 m/s^2 (Frequency 10 to 150 Hz, 150 min. in each of X, Y and Z direction)	
Shock resistance	500 m/s^2 (11 ms duration)	

10. AC Adapter (PS-P20023A)

Input voltage	100 to 240 VAC
Input frequency	50/60 Hz
Output voltage	Rated 16 V
Output current	4 A
Safety standard	PSE/CE/UL/GS

11. Battery

Battery	Lithium ion secondary batteries Mounted in main unit (“Hot swap” available)	
Quantity	Two batteries can be mounted.	
Battery life	Continuous operating of 5 hours (When new two batteries are mounted.) 4CH 100 kHz analysis/signal output OFF/liquid crystal backlight (bright)/ USB port is not used	
Battery status display	Main unit screen	Displays the remaining battery level on the main unit screen when operating on the secondary battery.
	Battery LED (BATT 1 , BATT2)	Orange LED is on during charging, green LED is on when full charged. (When connecting AC adapter)
		Red LED is on when LOW BATT (When remaining battery becomes less than 5 % and not mounted AC adapter)
	Display icon	Charging completed/charging/ charging stop/battery not mounted/ LOW-BATT
Processing when battery level drops	When remaining battery becomes less than 3 %, displays a warning message and shuts down automatically.	
	Stores the latest panel condition	
Charging time	Charging time when main unit is in operation	Approx. 8 to 9 hours (Depends on the usage conditions)
	Charging time when the power OFF	Approx. 4.5 to 5 hours
	External battery charger (Recommended product)	Approx. 4.5 to 5 hours

* When ambient temperature is 10 °C or less, turn on the power of the main unit and charge it. Charging is restricted or stopped when charging in a low temperature environment of 10 °C or less in the power off state.

12. Accessory

Accessories	AC adapter + power cable (2 m)	× 1
	Battery (lithium ion secondary battery)	× 2
	Instruction manual (User’s guide)	× 1
	CD-ROM (Reference guide, utility, etc.)	× 1
	SDHC memory card (4 GB)	× 1
	USB cable (For USB mass storage class, 1.5 m)	× 1

Optional Specification

Signal Output (CF-0971 1CH Signal Output Module): Hardware Option

Number of channels	1	
Output connector	BNC (Type C02)	
Isolation	Non-isolated	
Output voltage amplitude	±1 mV to ±10 V (amplitude+DC offset)	
Offset voltage	±10 V	
Output format	Unbalanced output	
Output coupling	DC	
Protection circuit	Short-circuit protection	
Output impedance	0 Ω or 50 Ω±10 %	
Maximum output current	10 mA	
D/A convertor	16-bit	
Conversion rate	max. 512 kHz	
Output waveform	Sine wave/swept-sine/pseudo random/random/impulse	
THD and spurious	-75 dB or less (at sine wave 1 kHz, amplitude ±1 V output)	
FFT Analysis length	256 to 16384	
Zoom analysis	Available (linked with the zoom analysis range)	
Voltage amplitude accuracy	±0.5 dB or less (at 1 kHz, 1 $V_{0\text{-}p}$, 1 MΩ load)	
Frequency accuracy	±50 ppm	
Digital filter	Smoothing filter	At baseband: 10th order ellipse
		At zooming: 6th order ellipse
	Octave band filter	1/1 or 1/3 octave
		6th order Butterworth
Pink filter	Analog method -3 dB/oct ± 1.0 dB (prescribed for 20 Hz to 20 kHz)	
Burst function	Single burst, continuous burst	
Burst cycle	Sine wave	1 to 32767 cycles
	Swept-sine/pseudo random/ impulse	1 to 32767 FFT frames
	Random	1 ms to 32 s
Cycle setting unit and burst interval	Sine wave	Sine wave 1 cycle
	Swept-sine/pseudo random/ impulse	1 FFT frame
	Random	1 ms
Taper function	Can be set individually when the signal is turned ON or OFF 1 ms to 32 s (1 ms-steps) This function is not available when the burst function is ON.	
Spectrum flatness	20 kHz to 100 kHz	±1.0 dB or less
	0 to 20 kHz	±0.2 dB or less
Crest factor	Sine wave	Approx. 1.41
	Swept-sine	Approx.1.4 to 1.6
	Pseudo random	3.3 or less
	Random	3.3 or less
	Impulse	32.0 or less

Log Sweep/Excitation Control CF-0942

Measurement mode (FRA mode)	
Dynamic range	150 dB (FRA)
Measurement frequency range	10 mHz to 100 kHz
Frequency resolution (Log sweep)	10, 20, 40, 50, 80, 100, 120, 160, 200, 250, 300, 320, 400, 500 lines/decade
Frequency resolution (Linear sweep)	100, 200, 400, 500, 800, 1000, 2000, 2500, 4000, 5000 lines/all band of the measurement frequency range
Number of times of averagings	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 25, 30, 40, 50, 60, 80, 100, 120, 150, 180, 200 times and optional number of times
Frequency range dividing setup mode	Addition times and signal output level can be changed for each measurement frequency range which is divided into up to 10.
Frequency resolution auto adjusting function	Automatically adjusts the decade of each frequency band and resolution to see the frequency characteristics accurately.
Frequency resolution increase function	Enables remeasurement of the specified frequency range resolution with a resolution 20 times the first measurement.
Calculation function	Frequency axis differential and integral calculus function (first order differential, second order differential, single integral, double integral), four arithmetic operation
Display	
Display of Frequency Response Function	Bode diagram (horizontal axis: frequency/vertical axis: gain and phase) Nyquist diagram (horizontal axis: real number part/vertical axis: imaginary number part) enables logarithmic scale display of amplitude
Display mode	FRF mode (triple screen display) 1)FRF (Bode diagram), COH (enables ON, OFF of display) 2)Nyquist or SPEC (1, 2ch overlay) 3)TIME, instantaneous spectrum (enables overlay display and specifying channel.)
	List mode (single screen display) 1)Measurement condition 2)List of No./frequency/FRF gain/FRF phase/COH/FRF real number part/FRF imaginary number part/SPEC1/ SPEC2/number of summations for all measurement data
	Peak List mode (double or triple screen display) List of frequency, gain and phase on the FRF bode diagram display using two ways. 1. Peak point of gain (automatic search) 2. Optionally specified point
	Memory mode 1)FRF of current status data 2)List of saved waveforms 3)Overlay display of waveforms selected from 2) (Up to 8 screens)
	Calculation screen (Quad screen display) 1)FRF of current status data 2)FRF of saved data 3)Waveform of four arithmetic operations and differential and integral calculus of 1), 2)/ Waveform of open and close loop conversion of 1), 2) * Waveform of calculation result also can be displayed. 4)Nyquist diagram of calculation result of 3)
Display function	Phase unwrap display
	Search delta function

Tracking Analysis CF-0922

Tracking analysis type	Phase
	Amplitude
Sampling method	Constant ratio tracking (external sampling): Up to maximum frequency analysis order
	Constant width tracking (internal sampling): Frequency range is the same as that of FFT analysis
Number of FFT sampling points	256 to 16384 points (power-of-two step)
Averaging function	Power spectrum exponential average
	Fourier spectrum exponential average
Max. analysis orders	6.25, 12.5, 25, 50, 100, 200, 400, 800
Max. number of blocks	100, 200, 400, 800, 1000
Analysis screen display	6 screens/list display of tracking available
Display function	Time-axis waveform, frequency analysis (amplitude, phase), order ratio analysis (amplitude, phase), constant-ratio tracking analysis (amplitude, phase), constant-width tracking analysis (amplitude, phase), fixed-frequency tracking analysis (amplitude, phase), time-tracking analysis (amplitude, phase), 3D map, Campbell plot
Number of display tracking diagrams	8 lines (excluding MAX ord, O.A)
Schedule function	Rotation schedule (with automatic judging of decreasing rotation speed)
	Time schedule (time trend)
Upper and lower limitation setting of rotation	UP (lower limit → upper limit)
	DOWN (upper limit → lower limit)
	UP/DOWN (lower limit → upper limit → lower limit)
	DOWN/UP (upper limit → lower limit → upper limit)
Simultaneous recording & analysis function	Available for constant-width tracking

Real-time Octave Analysis (RTA) CF-0923

Octave type	1/1 octave
	1/3 octave (filter: 6th order Butterworth)
	IEC 61260 Ed.1.0 (1995) Class 1, JIS C 1514: 2002 Class 1 ANSI S1.11: 2004 Class 1
Time weighting (Time constant)	10 ms, 35 ms, 125 ms (FAST), 630 ms, 1 s (SLOW), 8 s
	IMPULSE rising 35 ms/falling 1.5 s
	IEC 61672-1: 2002 Class 1, JIS C 1509-1: 2005 Class 1
Analysis frequency range	0.8 to 20 kHz (1/3 octave)
	1 to 16 kHz (1/1 octave)
Calculation function	Instantaneous value, maximum value of every one second, maximum value hold, and minimum value hold, power averaging value, power summation value, linear Leq
Analysis screen display	Up to 6 screens (Data overlay display available)
	List display of real-time octave
Simultaneous recording & analysis function	Available
Option	CF-0922 (Tracking Analysis)

LAN External Control Function CF-0947

〈Recommended environment〉

Client PC	OS	Windows®7 SP1 (64 bit/32 bit)
Software	Microsoft® Visual Studio®	2012 (VB, C#)
	Microsoft® Excel®	2007
Network cable	LAN cable	Category 6

Product list

Main unit

Model name	Product name
CF-9200	Portable 2ch FFT Analyzer
CF-9400	Portable 4ch FFT Analyzer

* Please refer to P.13 "12. Accessory" for accessories.

Options

Model name	Product name	
CF-0922	Tracking Analysis Function	(Software option)
CF-0923	Real-time Octave Analysis (RTA) Function	(Software option)
CF-0942	Log Sweep/Excitation Control Function * CF-0971 is required.	(Software option)
CF-0947	LAN External Control Function	(Software option)
CF-0971	1 ch Signal Output Module * An extra fee will be charged for installation after the purchase.	(Hardware option)
CF-0703	USB Connection Cable (1.5 m TYPE-A, mini-B for USB mass storage class function) (included at the time of purchase)	
CF-0951	Reference Guide (Japanese version, printed form) (PDF version is included on the attached CD-ROM.)	
CF-0951E	Reference Guide (English version, printed form) (PDF version is included on the attached CD-ROM.)	
CC-0025	Soft Carrying Case	
CC-0091	Hard Carrying Case	

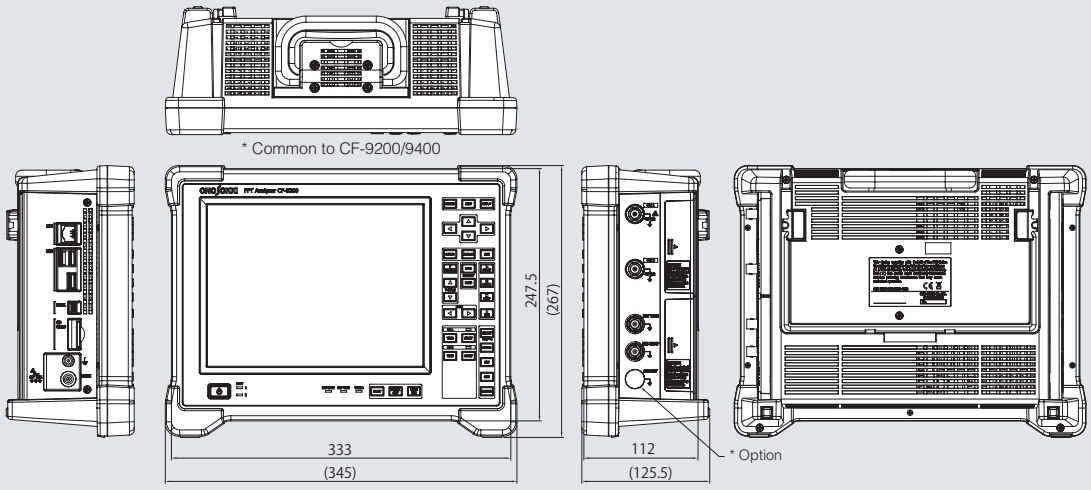
Related software

Model name	Product name
OC-1340	OC-1300 Toolbox DAT•TRC browser package OC-0340 DAT browser and OC-0341 TRC browser are included. For graph image, refer to P.10 and 11.
OC-0340	OC-1300 Toolbox DAT browser Graph software for exclusive Ono Sokki FFT series* (DAT files)
OC-0341	OC-1300 Toolbox TRC browser Graph software for exclusive OnoSokki FFT series* (TRC files)

* CF-7200(A), CF-9200/9400, DS-2000 series, DS-3000 series

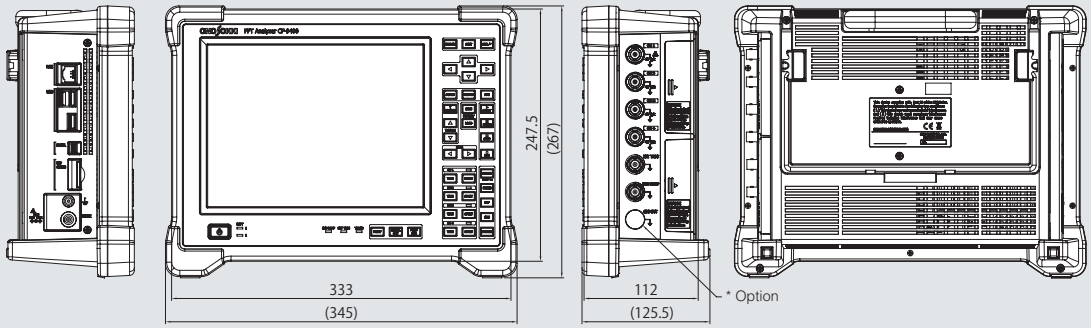
Outer Dimensions (Unit: mm)

CF-9200



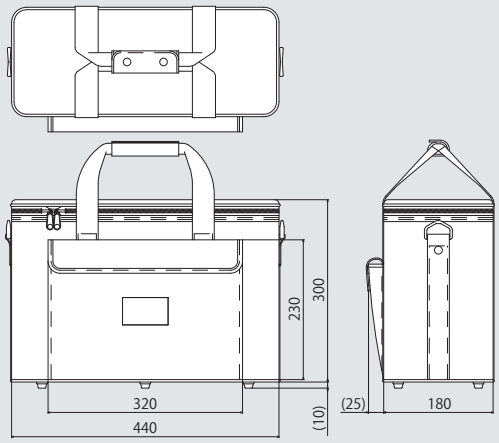
* Option: BNC (type C02) is mounted when CF-0971 (1CH Signal Output Module) is installed.

CF-9400

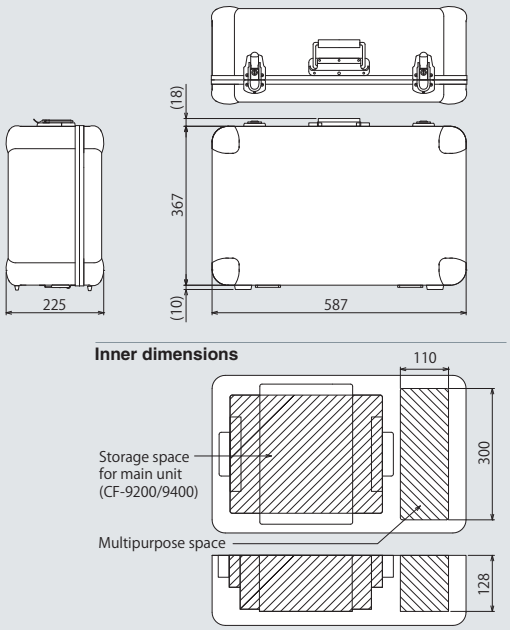


* Option: BNC (type C02) is mounted when CF-0971 (1CH Signal Output Module) is installed.

Soft Carrying Case CC-0025



Hard Carrying Case CC-0091



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* Outer appearance and specifications are subject to change without prior notice.
URL: https://www.onosokki.co.jp/English/english.htm

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