

CF-9000



**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 a range of operations with a swipe or tap, such as selecting the number of waveforms displayed and extending or shortening 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**

With the CF-9200/9400, the two on-board, large-capacity lithium ion secondary batteries enable continuous cordless operation of 5 hours\*1. The hot-swap feature allows the batteries to be replaced while the unit is powered on, enabling the analysis or recording operation to continue while eliminating the need for resetting. The unit can also be recharged while in operation.\*2

\*1 CF-9400 4ch, when CCLD is ON.

\*2 Full recharge takes 8 to 9 hours with the power on and 4.5 to 5 hours with the power off.



# taking action.

The CF-9200 and CF-9400 are 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 an external PC for analysis.

The new, exclusively developed 100 kHz high-performance analysis front-end system incorporating a 24-bit A/D converter enables easier and more reliable analysis than earlier models of noise and vibration generated by plant lines, pumps, motors, automobiles, railway vehicles, home electrical appliances and devices, and electrical and electronic parts. The CF-9200 and CF-9400 also offer solutions for field workers in their FFT analysis, including the resonance and frequency characteristics of mechanical structures in a vibrating environment with electromagnetic exciters and impulse hammers.

## Versatile

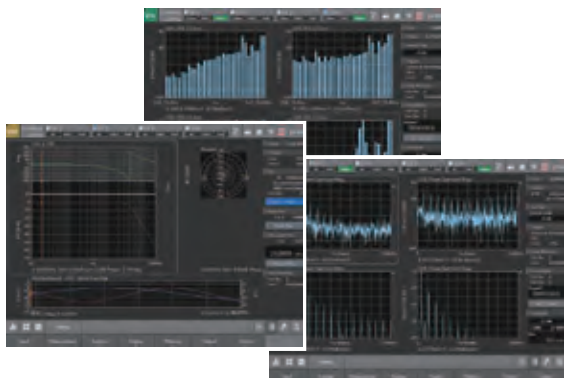
### FFT, RTA, excitation control & simultaneous recording

The unit is compact but versatile, capable of carrying out a range of operations from FFT analysis, real-time octave analysis (RTA)\*<sup>1</sup> and rotational tracking analysis\*<sup>2</sup>, to linear/log sweep analysis using signal output and amplitude control of electromagnetic exciter\*<sup>3</sup>. The unit can also perform simultaneous analysis and recording operations, allowing offline analysis using the CF-9200/9400 main machine and software applications.

\*<sup>1</sup> Real-time Octave Analysis (RTA) (CF-0923) is required.

\*<sup>2</sup> Tracking Analysis (CF-0922) is required.

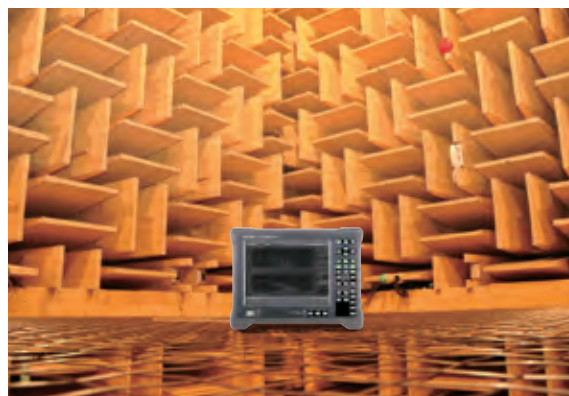
\*<sup>3</sup> Log Sweep/Excitation Control (CF-0942) is required.



## Quiet

### No fans or spindles means no noise or vibration

The CF-9200/9400 offer high performance without fans or spindles. The units do not produce mechanical noise or vibration, and so cannot be a source of noise or vibration in acoustic or vibration measurement/recording locations.



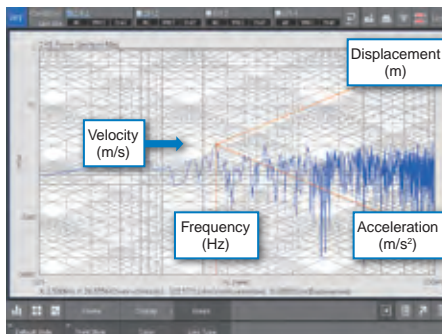
# Dynamic and steady with innovative and robust CF-9200 / 9400

## Real-time tripartite graph display

The CF-9200 / CF-9400 are equipped with real-time tripartite graph\* display as a new standard function. Three amplitude values (acceleration ( $m/s^2$ ), velocity ( $m/s$ ) and displacement ( $m$ )) at any arbitrary frequency can be read simultaneously in real time during FFT analysis of vibration.

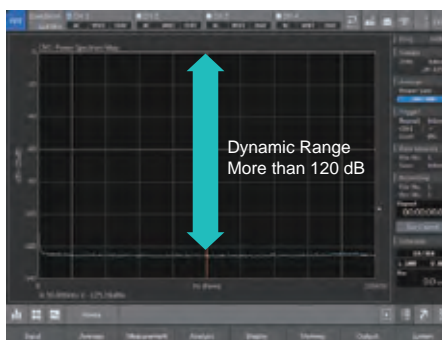
You do not need to operate individually for differential and integral processing and convert amplitude values using the frequency analysis function as before. Therefore, this function enables you to read three amplitude values quickly.

\* The tripartite graph (diagram) enables you to read amplitude values of acceleration ( $m/s^2$ ) and displacement ( $m$ ) which is based on velocity ( $m/s$ ), on the frequency ( $Hz$ ) axis.



## 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. This eliminates the need for voltage range change which otherwise needs to be frequently performed in acoustic or vibration measurement. Measuring and data recording do not need to be repeated, making measurement and analysis much more efficient and the FFT analyzer easier to operate even for novices.



## Isolated inputs

With the CF-9200/9400, all signal input channels are isolated (insulated). Highly resistant to ground loops and noise, the unit offers highly reliable measuring performance in locations 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 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 then automatically supplies the power to the sensor and performs unit calibration.



### \*1 What is CCLD (Constant Current Line Drive)?

It means a sensor interface using constant current supply. CCLD from 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 contains 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



# features.



## 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 of your choice 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, enlargement/reduction of time axis and frequency axis, offsetting of waveform, and graph span adjustment.



## Reliable inputs with the large hard keys

With the CF-9200/9400, operations such as turning the power on and off, changing data types and saving data are carried out using the new large hard keys. The positive feel of these keys assists fast and correct input even in unstable or confined sites, helping to prevent failures to save data.

Also equipped with a hard key and touch panel lock function (HOLD) in order to prevent unintended inputs and setting changes.



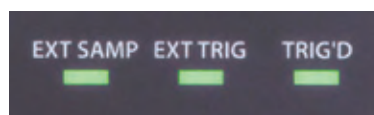
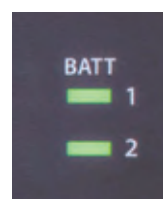
Channel and waveform selection (CF-9400)



Basic operations

## Highly visible LED indicators

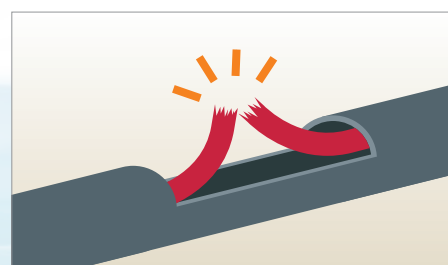
The statuses of major FFT operations are shown by LED indicators. The hard keys for major functions also have LED indicators. This enables the operator to monitor FFT operations even from a distance, such as the power-up process, the charge status of the secondary batteries and the excessive input to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



## Cable disconnection detecting function

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

\* Intended for a microphone with a built-in constant current line drive (CCLD) type preamplifier.



# From the laboratory to the field, real-time wave and simultaneous waveform recording can be

## CF-9200 / 9400

### FFT basic analysis function

#### Time waveform

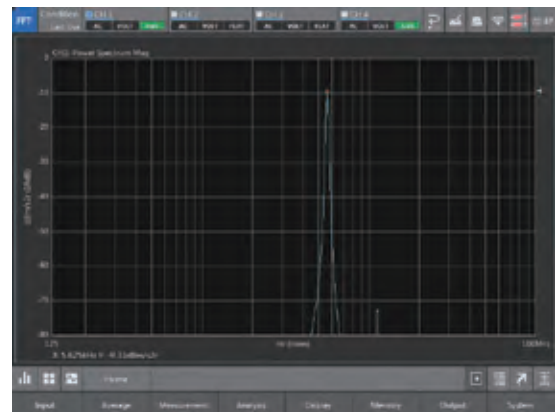
Performs A/D conversion of the voltage signal of vibration, noise, strain, voltage probe, etc. coming from a sensor and then displays the result as time-domain data. The X and Y-axis values at any point can directly be read using the search cursor. The delta cursor function makes it easier to read the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

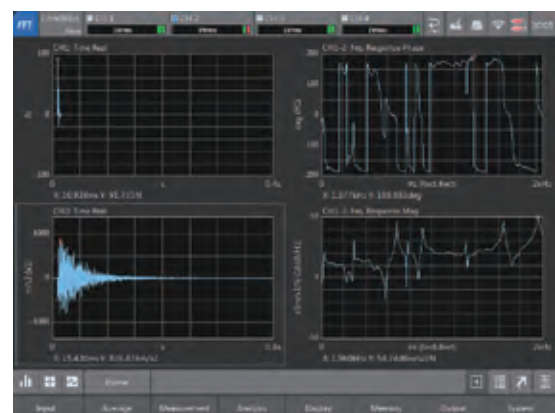
The power spectrum in FFT analysis shows the magnitudes of frequency components of a sampled time waveform, in the form of a graph indicating the power for each frequency band (frequency resolution  $\Delta f$ ) on the horizontal axis.

Power spectrum analysis enables detection of abnormal conditions of a facility, which are difficult to estimate through measurement of vibration and noise level and observation of time waveform. The natural frequency of a structure can also be measured.



#### Frequency response function

At the frequency response function (FRF), in a mechanical system or an electrical circuit, the input-to-output ratio is shown in gain and phase characteristics with the X 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.



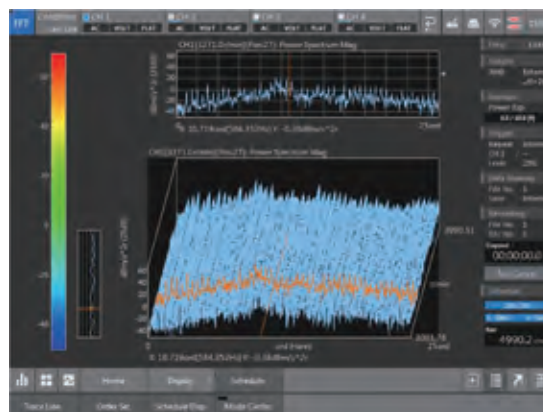
# form measurement / analysis achieved with just one unit.

## CF-9200 / 9400

### Optional software for analysis

#### Tracking Analysis (CF-0922)

For rotating machines such as engines and motors that have a wide range of operating speed, resonance caused by the natural frequencies of the machine parts and specific operating speeds can be a serious problem. The Tracking Analysis software (CF-0922) clearly presents in visual form which speeds of the rotating machine have increased noise and vibration and which parts of the machine are contributing to the problem.



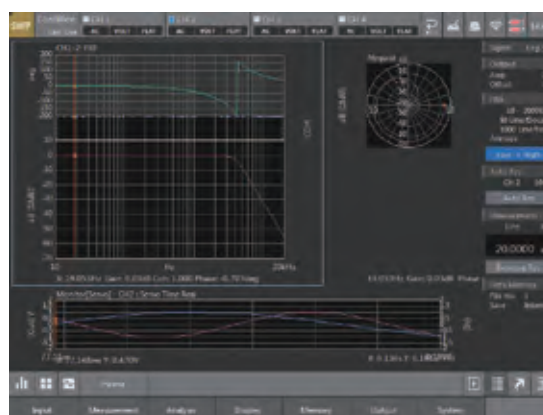
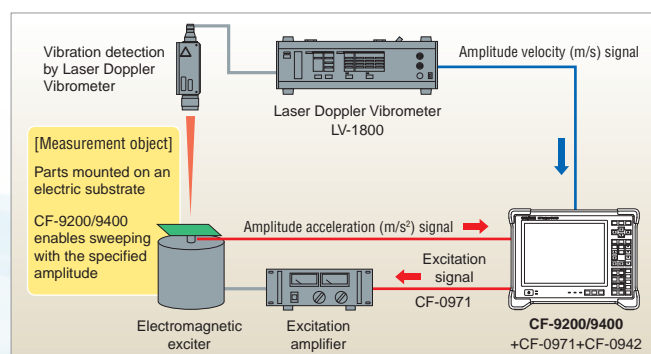
#### Real-time Octave Analysis (RTA) (CF-0923)

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. By using 1/1 and 1/3 octave bandpass filters, it is capable of generating the sound pressure level of each band of the frequency range of the noise being 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 having to consider the frequency characteristics of the exciter.

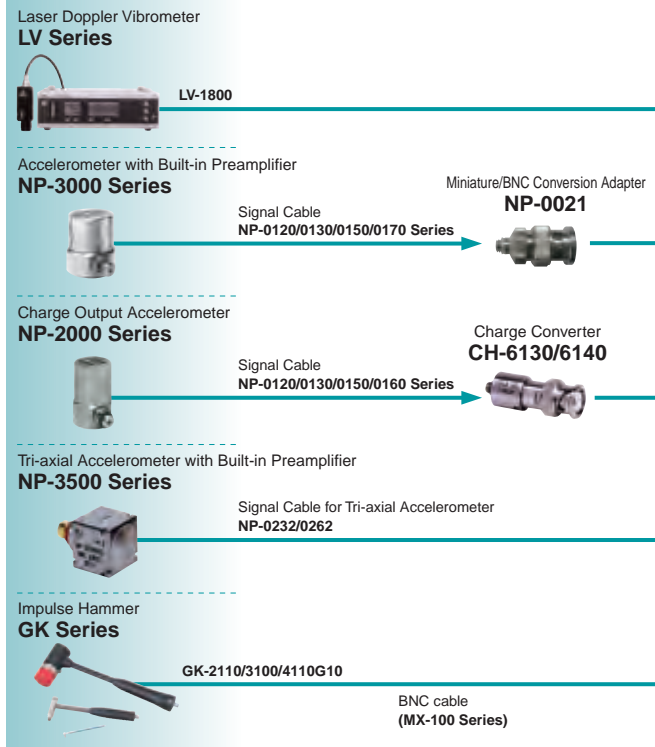


\* 1 ch Signal Output Module (CF-0971) is required for this software.

# System configurations

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

## Vibration



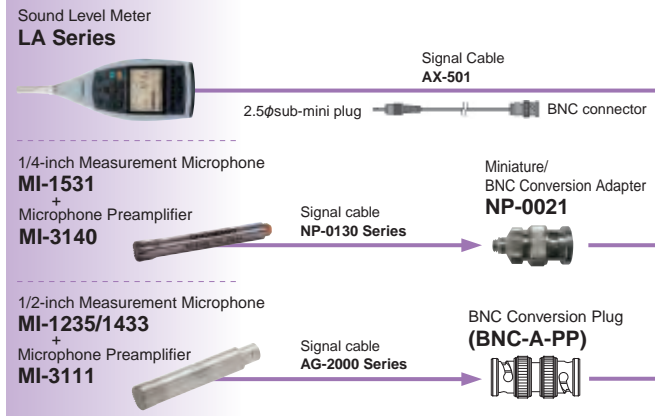
## Portable 4-channel FFT Analyzer CF-9400



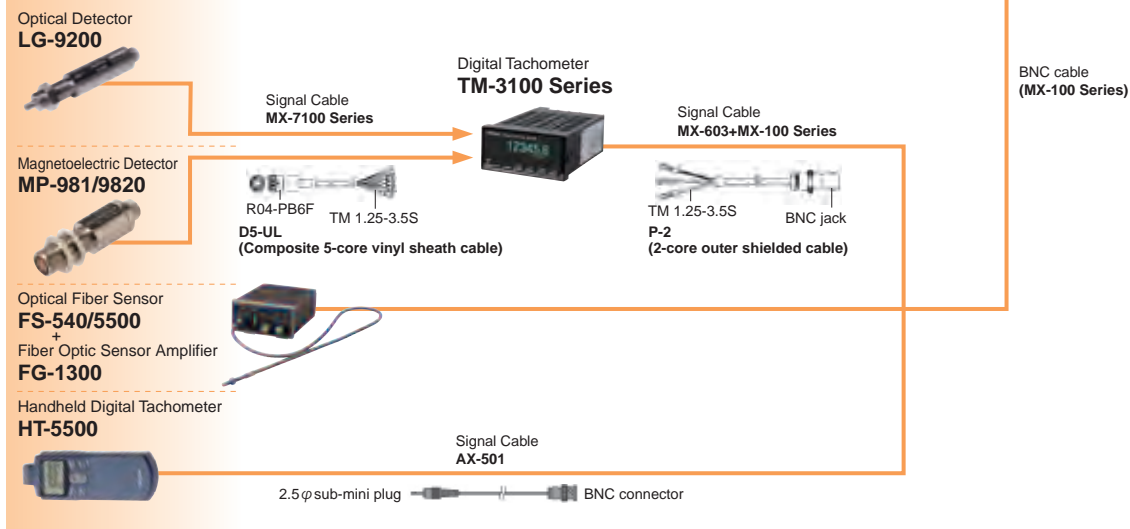
## Portable 2-channel FFT Analyzer CF-9200



## Sound



## Rotation





### 1. Input Section

Number of input channels (CF-9200)	2 channels		
Number of input channels (CF-9400)	4 channels		
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. 1.0 based accelerometer 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 and 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 (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	4 order Butterworth: LPF 450 kHz -3 dB		
Digital filter	FFT aliasing filter	At baseband: 10 order ellipse At zooming: 6 order ellipse	
	Real-time octave band	6 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 0.5 V, range 0.025 V to 24 V)	
	Input frequency range	0 to 300 kHz (Out-of-band filter 300kHz -3 dB)	
		30 VAC/30 VDC	
	Number of input pulses/rotation	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 300kHz -3 dB)	
		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		

### 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.) 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: Press and hold the switch until a beep is made. After the beep, lift the finger off to the power OFF. 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, $\Delta$ 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 printing with the specified conditions directly.	
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 %
	Hysteresis level	0 to 99 (Unit: %) Default: 2 %
	Position	±8191
	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/Fourier spectrum/filtered 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

### 6. Memory Functions

Recording device	Selectable 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))
	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 memorized.	

7. Interface		
USB	Number of ports	3 (Type A)
	USB	USB 2.0, USB memory for 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 LAN connection	Wireless LAN module	Recommended products: please refer to our web site.
	Bluetooth® module	
SD card	Number of ports	1
	Supports SD/SDHC	Capacity: 4 GB, 32 GB Recommended products: please refer to our web site.
LAN	Number of ports	1
	10BASE/100BASE-TX/1000BASE-T	External control
Printer output	Print by PRINT key of the main unit	
	Interface	USB or Bluetooth® (When Bluetooth® module mounted)
	Applicable printer	Please refer to our web site.
	Output data	Screenshot/list display copy

8. Other Functions	
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 Specifications		
Power supply	AC adapter or batteries (Both provided as standard)	
Power consumption	CF-9400 (When the CF-0971 1 ch Signal Output Module option is installed.)	87 VA or less (When AC adapter is used, not during battery charging)
	CF-9200 (When the CF-0971 1 ch Signal Output Module option is installed.)	150 VA or less (AC adapter is used, during battery charging) 73 VA or less (AC adapter is used, not during battery charging) 150 VA or less (AC adapter is used, during 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 M3xL6 recommended)	
Outer dimensions	Smaller than 333(W)x248(H)x112(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 (EN61010-1: 2010, EN61326-1: 2013, EN50581: 2012)	
Vibration resistance	9.8 m/s <sup>2</sup> (Frequency 10 to 150 Hz, 150 min. in each of X, Y and Z direction)	
Shock resistance	500 m/s <sup>2</sup> (11 ms duration)	
Accessories	AC adapter + power cable	x 1
	Battery	x 2
	Instruction manual (User's guide book)	x 1
	CD-ROM (Reference guide, utility, etc.)	x 1
	SDHC memory card (4 GB)	x 1
	USB cable (For USB mass storage class)	x 1

10. AC Adapter (PS-P20018A)	
Input voltage	100 to 240 VAC
Input frequency	50/60 Hz
Output voltage	Rated 16 V
Output current	4 A
Safety standard	CE/UL/GS/PSE

11. Batteries		
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)/when 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 using AC adapter)
	When remaining battery becomes less than 15 %, displays a warning message.	
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 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

12. Signal Output (CF-0971 1CH Signal Output Module): 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 converter	16-bit	
Conversion rate	512 kHz max.	
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 (Relative to zoom analysis range)	
Voltage amplitude accuracy	±0.5 dB or less (At 1 kHz, 1 V <sub>0-p</sub> , 1 MΩ load)	
Frequency accuracy	±50 ppm	
Digital filter	Smoothing filter	At baseband: 10 order ellipse At zooming: 6 order ellipse
	Octave band filter	1/1 or 1/3 octave 6 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
Cycle setting unit and burst interval	Random	1 ms to 32 s
	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 disabled 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

13. 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	(Software option)
	* CF-0971 is required.	
CF-0971	1 ch Signal Output Module	(Hardware option)
	* An extra fee will be charged for installation after the purchase.	
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	

14. Recommended Products	
Model name	Product name
DR202	Battery for the CF-9000 series (2 batteries are included at the time of purchase)
PS-P20018A	AC adapter (Included at the time of purchase)
VM1072-VM1700	Power cable for PS-P20018A (2 m) (for Japan)
VM0600-VM0299A	Power cable for PS-P20018A (2 m) (for North America)
VM0307C-VM0308	Power cable for PS-P20018A (2 m) (for Europe)
VM0721-VM0749	Power cable for PS-P20018A (2 m) (for China)
PS-P20021A	Battery charger set (Battery charger and AC adapter. AC line cable is required. (sold separately))
VM1182-VM1276-2M	AC line cable for PS-P20021A (for Japan)
VM0233-VM0076B-2M	AC line cable for PS-P20021A (for North America)
VM0306B-VM0304B-2M	AC line cable for PS-P20021A (for Europe)
Bluetooth® adapter	Please refer to our web site.
Wireless LAN adapter	For more details, please contact your nearest distributor or contact us at overseas@onosokki.co.jp.
SDHC memory card (4 GB)	(SDHC memory card (4 GB) is included at the time of purchase.)
SDHC memory card (32 GB)	



## Optional Software Specifications

### Log Sweep/Excitation Control CF-0942

Measurement mode (FRA mode)	
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 averaging	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 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	Board diagram (Horizontal axis: frequency/vertical axis: gain and phase) Nyquist diagram (Horizontal axis: real number/vertical axis: imaginary number) Enables logarithmic scale display of amplitude
Display mode	FRF mode (Triple screen display) 1)FRF (Board 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 /FRF imaginary number/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 board 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) 4) * Waveform of open and close loop conversion of 1), 2) 5)Nyquist diagram of calculation result of 3), 4) * Waveform of calculation result also can be displayed
Display function	Phase unwrap display Search delta function

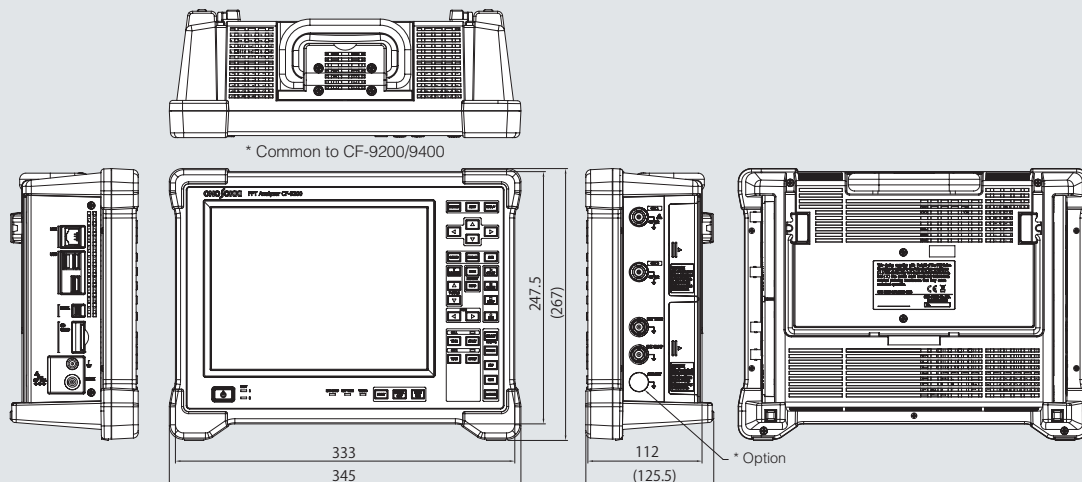
### Tracking Analysis CF-0922

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 mean Fourier spectrum exponential mean
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
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 times	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

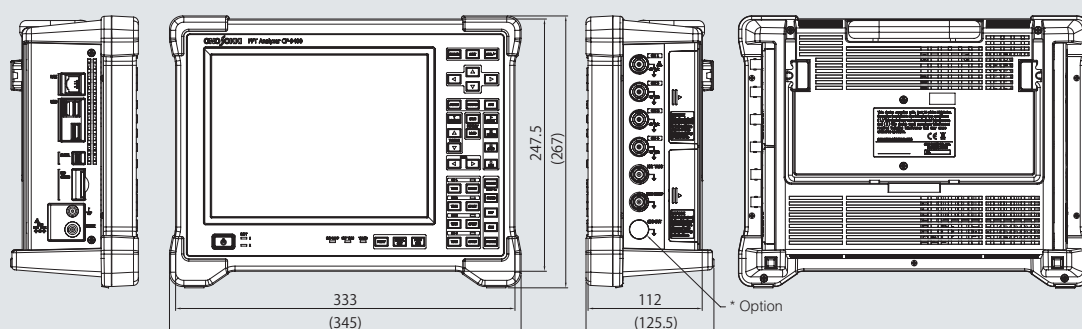
Octave type	1/1 octave 1/3 octave (Filter: 6th Butterworth) IEC 61260 Ed.1.0 (1995) Class 1, JIS C 1514: 2002 Class 1 ANSI S1.11: 2004 Class 1
Time weighting (Time constant)	10 ms, 35 ms, 125 ms (FAST) 630 ms, 1 s (SLOW), 8 s, IMPULSE rising 35 ms/falling 1.5 s IEC 61672-1: 2002 Class 1, JIS C 1509-1: 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 display
Simultaneous recording & analysis function	Available
Option	CF-0922 (Tracking Analysis)

### CF-9200



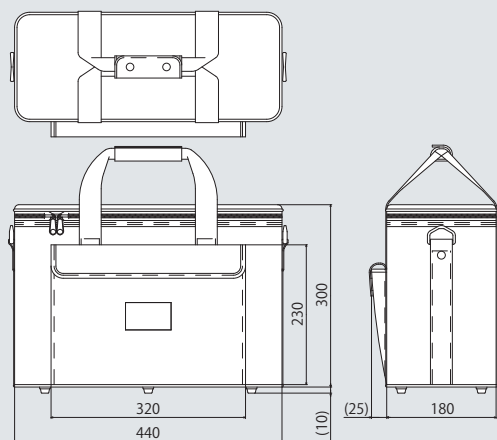
\* Option: BNC (type C02) is fixed in when CF-0971 (1CH Signal Output Module) is installed

### CF-9400

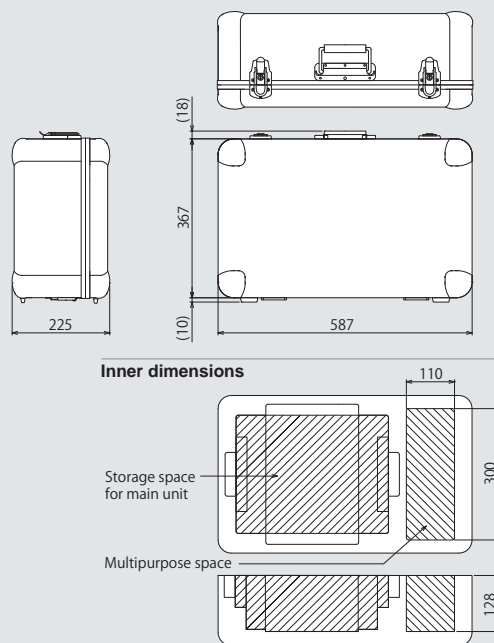


\* Option: BNC (type C02) is fixed in when CF-0971 (1CH Signal Output Module) is installed

### Soft Carrying Case CC-0025



### Hard Carrying Case CC-0091



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