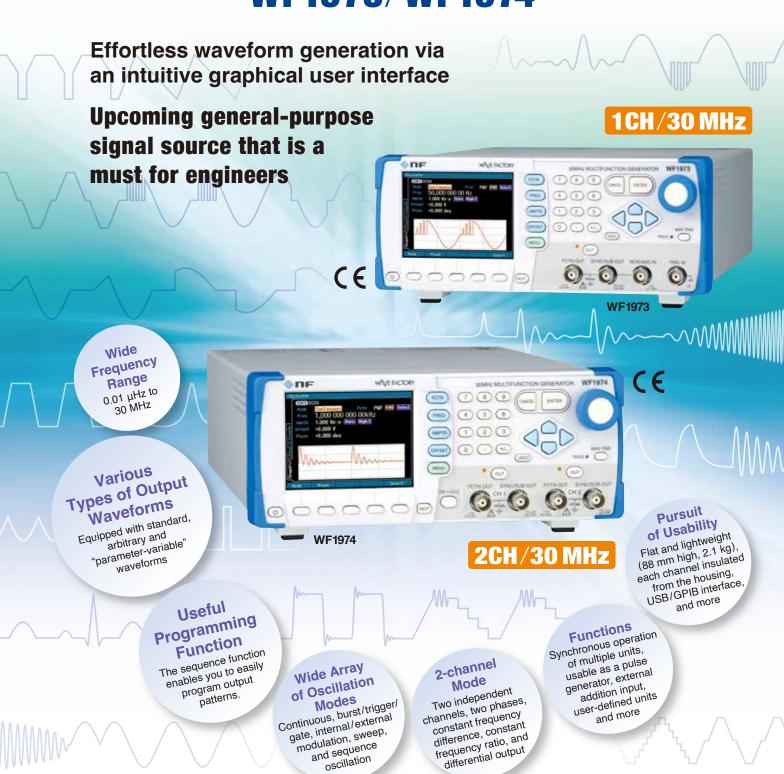


# W/VE FACTORY

# **MULTIFUNCTION GENERATOR**

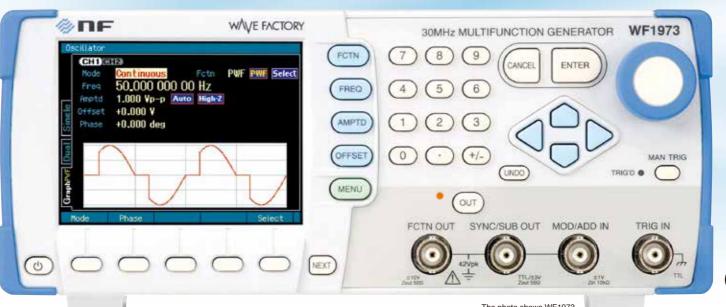
## WF1973/WF1974



## **Generate the** waveforms you need-effortlessly!

#### Wide array of functions for a broad range of applications

While the WF1973 and WF1974 can generate standard waveforms such as sine and square waves, application-specific waveforms such as Gaussian pulse and chattering, and arbitrary waveforms, these generators also have a wide array of functions, including sequence, modulation, and sweep. These are up-and-coming general-purpose signal sources that are a must for engineers and should be kept on hand for a wide variety of applications.



W/VE FACTORY

## **MULTIFUNCTION GENERATOR**

WF1973 [1CH] WF1974 [2CH]

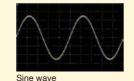
 $0.01 \,\mu\text{Hz}$  to 30 MHz

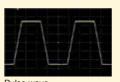
The photo shows WF1973.

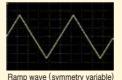
## Anytime, Anywhere

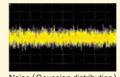
### Handy signal source generates basic functions quickly and reliably

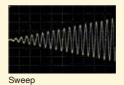
The WF1973 and WF1974 are easy to use as general-purpose signal sources for routine tests. Both standard waveforms and various modifying functions, including sweep, modulation, burst and duty variable, can be operated intuitively. Use of direct digital synthesis (DDS) ensures superior stability and repeatability, and so supports reliable testing.

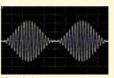




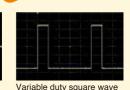












Three methods allow you to generate or program Any Waveform!

(ii) Gaussian pulse

## quickly found and generated.

## Parameter-Variable Waveform

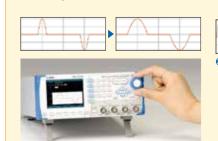
NF has incorporated an innovative waveform library called a parameter-variable waveform function.

The parameter-variable waveform offers an easy-order waveform system. The appropriate waveform for your purpose can be generated easily: just select a preprogrammed waveform and edit it using parameters specific to your requirements. The 25 types of available waveforms include circuit-related, communication-related, and machine-related waveforms

#### For Example

The CF (crest factor) can be set within a range from 1.41 to 10.00 and varied easily using the modify knob.

Waveforms generated in this way can be treated as standard waveforms with respect to frequency, amplitude, oscillation mode and other parameters.



#### The desired waveform can be Names and Variable Parameters of Incorporated Waveforms

1 Unbalanced sine Clipped sine 3 CF controlled sine 4 Conduction angle 5 Staircase sine 2nd half amplitude · Conduction angle

6 Multi-cycle sine On-phase control- Number of cycles · Start phase

(3) Off-phase control-Off-phase

 On-phase Number of chattering · On-state time · Off-state time

Off-phase

 Number of chatterin Off-state time

(B) Haversine Lorentz pulse (1) Half-sine pulse (5) Trapezoid pulse Slope width

@ Damped oscillation Temponential rise ® Exponential fall 19 2nd-order LPF · Number of zero Time constant step response

② Oscillation surge Pulse surge Oscillation freque Damping time constant Duration time 3 Trapezoid wave with offset · Leading delay

Upper base width

Leading edge time Rising-slope width Falling-slope width

49 Half-sine edge

Damping time

## Flexible Program Output Patterns

### **Sequence Function**

The sequence function programs and sequentially outputs parameters such as waveform, frequency and amplitude. Repetition, jump and other such behavior can be programmed, so constantly changing

signals—such as machine vibration and voltage fluctuation—and long complex output patterns can be generated easily. The sequence function allows sudden changes to parameters, and can be used with parameter-variable waveforms and sweep functions. The sequence function substantially expands the range of applications for which our function generators are suitable

Parameters: waveform, frequency, phase, amplitude, DC offset, square wave duty, step time, hold operation, jump destination, number of jumps, step stop phase, branch operation, step termination control, and more

Number of steps: 1 to 255 per sequence Number of saved sequences: 10 Maximum number of usable waveforms: 128

## Program Example Using the Sequence Function .....



The table on the right shows the program (sequence list) used to generate the signal on the left. The WF1973 and WF1974 can execute such simple programs automatically The Sequence Editor facilitates generation, editing, and a number of other processes for more complicat

,	Step		Frequency				Sweep
)	Отор	form	[Hz]	[Vp-p]	[V]	[s]	Опоор
,	1	DC	_	0	0	0.15	_
	2	DC	_	0	5	0.2	ON
1	3	Sine	20	2	5	0.15	_
/.	4	DC	_	0	5	0.1	_
3	5	DC	_	0	3.75	0.1	_
f	6	DC	_	0	2.5	0.1	_
t-	7	DC	_	0	1.25	0.1	_
	8	DC	_	0	0	0.1	_



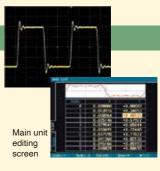


## Up to 512 K words/Waveform, 4 M words

#### **Arbitrary Waveforms**

Arbitrary waveforms up to 512 K words can be output. Up to 128 waveforms can be stored in the large 4 M words memory. Highly precise waveforms are generated using high-resolution (14-bit), high-speed (120M samples/sec) sampling. Waveforms can be generated easily either via the control panel (linear interpolation of control points) or in software using the Arbitrary Waveform Editor, which also allows external data to be imported and mathematical expressions to be applied

Preprogrammed parameter-variable waveforms can be retrieved and edited as required.





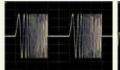
Arbitrary Waveform Editor

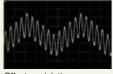


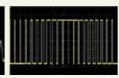
## Fully equipped with the functions and performance that are required for function generators. The WF1973 and WF1974 are simple to operate and provide high-precision waveforms for a wide range of applications.

## Multifunctional A variety of oscillation modes and flexible scalability

#### Sweep and modulation functions

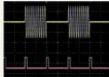






Frequency, phase, amplitude, DC offset and duty sweeps can be performed in one-way or shuttle, linear or logarithmic slope\*, and continuous, single-shot or gated single-shot modes. Marker and X-drive outputs are available. DC offset modulation and PWM modes are supported as well as FM, FSK, PM, PSK, and AM-both internal and external modulation. These function generators can address a wide range of applications. Logarithmic mode is supported only for frequency sweeping.

#### Burst/trigger/gate







Full-wave rectification waveform (burst/trigger)

In the burst oscillation mode, oscillation can be started or stopped at any wave count. WF1973 and WF1974 support four modes;

Auto burst: No trigger is needed

Trigger burst: Oscillation in sync with the trigger

Gate: Oscillation in sync with the gate signal

Triggered gate: Gate oscillation switched on/off by gate upon trigger The phase where oscillation starts/stops and the level at which oscillation starts/stops can be set.

#### As pulse generator







Rising/falling time variable Rising time (15 ns) X: 10 ns/DIV

With great speed and operability, the WF1973 and WF1974 show excellent performance when used as a pulse generator or signal source for digital circuits. The duty/time, rising time, and falling time of pulse waves can be individually set, so these generators are best suited to operation testing of a wide variety of digital equipment and devices, data transmission equipment,

#### External 10 MHz frequency reference input, synchronous operation of multiple generators

A high-accuracy frequency can be output when an external 10 MHz standard signal is input into the external 10 MHz frequency reference input

Synchronous operation of up to six units is possible in the form of master/slave connections\*, using the frequency reference output (REF OUT) and frequency reference input (REF IN). A multi-channel (multi-phase) oscillator can be configured \* A BNC cable is used for connection



## 2 Channels

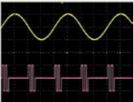
### Ideal 2-channel generator



The WF1974 is a dual-channel function generator. Each channel is insulated from the housing and has the same functions and performance as a single-channel WF1973. In addition, the WF1974 offers two phase, constant frequency difference, constant frequency ratio and differential output-all features that are unique to NF dual-channel function generators.

- Independent output (Indep) Two phase (2-Phase)
- : Two channels programmed separately Same frequency
- Constant frequency
  - Difference in frequencies is constant.
- difference (2-Tone)
- Constant frequency ratio (Ratio): Ratio of frequencies is constant
- : Reverse phase waveform with identical frequency. Differential output (Diff) amplitude, and DC offset.





## High Accuracy High specifications to generate quality waveforms

Above all else, function generators must be very accurate. The WF1973 and WF1974 are high-specification instruments that deliver exceptional precision, stability and reliability in support of a wide variety of applications.

- Frequency accuracy : ±(3 ppm of setting + 2 pHz)
  - (External frequency reference of 10 MHz
  - usable )
- Frequency resolution: 0.01 μHz
- Amplitude accuracy : ±(1% of amplitude setting [Vp-p] + 2 mVp-p)/open
- Phase setting resolution1: 0.001 (setting range: -1800.000 to +1800.000)
- Duty setting range : 0.0000% to 100.0000%; resolution; 0.0001%
- Pulse wave rising/falling time: 15.0 ns to 58.8 Ms; 3-digit resolution/0.1 ns
- Resolution of arbitrary waveform data amplitude: 16 bits

#### Operability

### Thorough pursuit of usability

# 50,000 000 00 Hz 1.000 Vp-p Auto High-Z +0.000 V

#### Waveform display

The TFT color LCD display with the QVGA high resolution has been adopted. A variety of setup parameters can be seen at a glance and the set waveform is also displayed. Setting errors can be avoided because the waveform to be output can be intuitively checked

#### **User-defined unit function**

The frequency, period, phase, amplitude, DC offset and duty can be set and displayed in desired unit (up to four characters), using a specified conversion expression.

#### Other features

- Input/output signal ground independent of housing and signal ground between channels also insulated.
- Output voltage under specified load impedance can be set and displayed.
- External signals can be added and output.
- Up to ten settings can be saved.
- USB and GPIB interfaces.
- I abVIFW driver included
- Power supply input for 90 V AC to 250 V AC
- enables worldwide use. • Flat and light body (88 mm high, about 2.1 kg)

### Applications We can satisfy a variety of waveform-related needs.

## Electronic equipment and parts

Ultrasonic motor drive testing, differential/balanced input testing, LCD panel operation testing, copier drum (developing bias) testing, digital circuit evaluation testing, and evaluation of ICs

Communication and audio equipment

Testing of echo cancellers which act as IQ signal generator/clock sources for mobile communication systems, amplifier and speaker tone burst testing and linearity measurement, and wireless communication equipment evaluation testing

### Automobiles

Gear rotation signal simulation, precision work for turbo chargers, inverter evaluation ABS and power-steering device testing, ECU and sensor oper-

## Machinery, controls, and construction

Industrial robot and servo system adjustment and testing, pulse motor driving, building vibration experiments (for incorporating vibration testers), water-tank-based wave generation tests, and material fatigue testing

## Other applications

Simulation of biosignals, electrolysis, electroplating, and battery charge/discharge testing, breaker testing, three-phase power source simulation, power source modulation testing, a frequency standard for measurement equipment management room, experiments and science projects in universities and technical colleges

#### Power amplifier that boosts output

#### High-Speed Bipolar Amplifier -BA4825/HSA Series



Example when combined with BA4825 NF recommends using our high-speed bipolar power amplifiers (BA4825/HSA

•.....

Series) as power amplifiers for drive testing and other applications where a high voltage is applied to DUT, such as electronic parts or devices. These power amplifiers attain high-speed response and high voltage output, as well as wide frequency range. In addition, four-quadrant operation enables them to serve as the source (supply) and sink (absorption) for positive/negative voltage and current. They stably operate (output power) under capacitive or inductive loads such as a piezoelectric element or solenoid

### BA4825

- Wide band: DC, up to 2 MHz
- High voltage output: 300 Vp-p
- Output current: 0.5 Arms
- Slew rate: 500 V/us
- Low output impedance Output polarity switching function and more



#### **HSA Series**

- Wide band: DC, up to 1 MHz
- High voltage output: up to 300 Vp-p
- Slew rate: up to 475 V/µs
- Low output impedance
- DC offset and more





#### Specifications

#### **▼** Waveform and Oscillation Mode

	Sine, square, pulse, ramp, and parameter-variable waveforms (25 types), noise (Gaussian distribution), DC, and arbitrary waveform
Oscillation modes	Continuous, modulation, sweep, burst, and sequence

## ▼ Frequency and Phase

Frequency setting range				
Oscillation mode Waveform	Continuous, modulation, and sweep (continuous/ single-shot)	1 (0	Sequence	
Sine	0.01 μHz to 30 MHz	0.01 μHz to 10 MHz	0.01 μHz to 10 MHz	
Square	0.01 μHz to 15 MHz	0.01 μHz to 10 MHz	0.01 μHz to 10 MHz	
Pulse	0.01 μHz to 15 MHz	0.01 μHz to 10 MHz	not avaiable	
Ramp	0.01 μHz to 5 MHz	)1 μHz to 5 MHz		
Parameter-variable	0.01 μHz to 5 MHz	1 μHz to 5 MHz		
Noise	The equivalent band	ne equivalent bandwidth is fixed to 26 MHz.		
DC	Frequency setting in	valid		
Arbitrary	0.01 μHz to 5 MHz			
Frequency setting resol	lution 0.01 µHz	0.01 μHz		
Frequency accurac	cy*1 ±(3 ppm of set	±(3 ppm of setting + 2 pHz), aging rate*1: ±1 ppm/year		
Phase setting rang	e -1800.000° to	-1800.000° to +1800.000°		

#### ▼ Output Characteristics

•	▼ Output Characteristics			
Amplitude	Setting range	0 V <sub>P</sub> -p to 20 V <sub>P</sub> -p/open, 0 V <sub>P</sub> -p to 10 V <sub>P</sub> -p/50 Ω AC+DC ≤ ±10 V/open		
	Setting resolution	999.9 mV <sub>P</sub> -p or less: 4-digit/0.1 mV <sub>P</sub> -p 1 V <sub>P</sub> -p or greater: 5-digit/1 mV <sub>P</sub> -p		
Idu	Accuracy*1*3	±(1% of amplitude setting [V <sub>p-p</sub> ] + 2 mV <sub>p-p</sub> )/open		
Ā	Setting unit	Vp-p, Vpk, Vrms, dBV, and dBm		
	Resolution of waveform amplitude	Approx. 14 bits (36 mVp-p/open or greater)		
	Setting range	±10 V/open, ±5 V/50 Ω		
offset	Setting resolution	499.9 mV or less: 4-digit/0.1 mV, ±0.5 V or greater: 5-digit/1 mV		
DC off	Accuracy*1	$\pm ( 1\% \text{ of DC offset setting [V]}  + 5 \text{ mV} + 0.5\% \text{ of amplitude setting [Vp-p]})/\text{open (20°C to 30°C when outputting sine waves of 10 MHz or less)}$		
Οι	utput impedance	50 Ω unbalanced		
Synchronous/ sub output		Sync signals: TTL level Internal modulation signal: -3 V to +3 V/open Sweep X drive: 0 V to +3 V/open		

#### V Ciamal Characteristics

$\blacksquare$	▼ Signal Characteristics				
	Amplitude frequency characteristics*1		Up to 100 kHz 100 kHz to 5 MHz 5 MHz to 20 MHz 20 MHz to 30 MHz (50 mVp-p to 10 Vp-p	: 0.1 dB : 0.15 dB : 0.3 dB : 0.5 dB (±0.8 dB at 2. //50 Ω ,1 kHz reference)	8 V <sub>p-p</sub> /50 Ω or greater)
Sine wave	Total harmonic distortion*1		10 Hz to 20 kHz	: 0.2% or less (0.5 V	/p-p to 10 Vp-p/50 Ω)
e v	Harmonic			0.5 Vp-p to 2 Vp-p/50 Ω	2 Vp-p to 10 Vp-p/50 Ω
ı≅			to 1 MHz	-60 dBc or less	-60 dBc or less
	sp	urious*1	1 MHz to 10 MHz	-50 dBc or less	-43 dBc or less
			10 MHz to 30 MHz	-40 dBc or less	-30 dBc or less
	Non-harmonic spurious*1			-60 dBc or less -50 dBc or less z -45 dBc or less	(0.5 V <sub>p-p</sub> to 10 V <sub>p-p</sub> / 50 Ω)
Square wave	Duty variable		Standard: Setting range: 0.0100% to 99.9900% Upper limit (%): 100 – frequency (kHz)/300 Lower limit (%): frequency (kHz)/300 Jitter: 300 ps rms or less typ. Extended: Setting range: 0.0000% to 100.0000% Jitter: 2.5 ns rms or less typ.		
S	Ris	sing/falling time*1	17 ns or less		
	Overshoot		5% or less typ.		
a)	Pulse width		Duty setting range: 0.0170% to 99.9830% Time setting range: 25.50 ns to 99.9830 Ms		
Pulse wave	Rising/falling time		Rising/falling time	Ons to 58.8 Ms (3-dig e independently set ting value is 0.01% or er.	,
	Ov	vershoot	5% or less typ.		
Ra	amp	wave	Symmetry setting	range: 0.00% to 100	.00%
	Fu	nction	5% or less typ.		
forms	səu	Steady sine wave group		lipped sine, CF controll e, staircase sine, and r	
wave	nd names	Transient sine wave group		ed sine, off-phase co , and chattering-off s	
Parameter-variable waveforms	Waveform types and	Pulse waveform group	Gaussian pulse, L trapezoid pulse, a	orentz pulse, Havers and Sin (x)/x	sine, half-sine pulse,
eter-v	orm ty	Transient response waveform group	Exponential rise, e response, and da	exponential fall, 2nd omped oscillation	order LPF step
am	vefc	Surge waveform group	Oscillation surge	and pulse surge	
Par	Wav	Others group		set, half-sine edge p	ulse, and bottom

waveform	Waveform length	4 K to 512 K words (2 <sup>n</sup> , n=12 to 19) or the number of control points is 2 to 10,000 (Control points are linearly interpolated.)
\ VaV	Total of waveform	Up to 128 waves or 4 M words (total of channels 1 and 2),
Arbitrary v		saved in the nonvolatile memory.
	Resolution	16 bits
Ā	Sampling rate	120 MS/s

#### **▼** Modulation

	Woddiation		
Internal modulation	Modulation waveforms	Other than FSK and PSK: Sine, square (duty of 50%), triangle (symmetry of 50%), rising ramp, falling ramp, noise, arbitrary waveforms FSK and PSK: Square (duty of 50%)	
Intern	Modulation frequency	Other than FSK and PSK: 0.1 mHz to 100 kHz (5-digit/0.1 mHz) FSK and PSK: 0.1 mHz to 1 MHz (5-digit/0.1 mHz)	
ution	Input voltage range	±1 V full scale (other than FSK and PSK)	
inpou	Input impedance	10 kΩ, unbalanced (other than FSK and PSK)	
External modulation	Input frequency	DC to 25 kHz (other than FSK and PSK) DC to 1 MHz (FSK and PSK)	
	FM	Carrier waveform: Arbitrary waveform and standard waveform other than noise, pulse, and DC Peak deviation: 0.00 µHz to less than 15 MHz	
	FSK	Carrier waveform: Arbitrary waveform and standard wave- form other than noise, pulse, and DC Hop frequency: Within the frequency settable range for each carrier waveform	
nditions	РМ	Carrier waveform: Arbitrary waveform and standard waveform other than noise and DC Peak deviation: 0.000° to 180.000°	
s and cor	PSK	Carrier waveform: Arbitrary waveform and standard waveform other than noise and DC Deviation: -1800.000° to +1800.000°	
Modulation types and conditions	AM	Carrier waveform: Arbitrary waveform and standard waveform other than DC Modulation depth: 0.0% to 100.0% (DSB-SC and non-DSB-SC supported)	
Mod	DC offset modulation	Carrier waveform: Standard waveform and arbitrary waveform Peak deviation: 0 V to 10 V/open	
	PWM	Carrier waveform: Square wave and pulse wave Peak deviation: Square wave of normal duty variable range: 0.0000% to 49.9900%, Square wave of extended duty variable range: 0.0000% to 50.0000%, Pulse: 0.0000% to 49.9000%	

#### **▼** Sweep

Vollecp		
Sweep types	Frequency, phase, amplitude, DC offset, and duty	
Sweep functions	One-way (ramp wave shape)/shuttle (triangle wave shape) selectable Linear/logarithmic selectable (only when sweeping the frequency)	
Sweep range setting	The start and stop values or the center and span values are specified.	
Sweep time setting range	0.1 ms to 10,000 s (4-digit/0.1 ms)	
Sweep modes	Continuous/single-shot/gated single-shot selectable Oscillation only occurs during sweep execution in the gated single-shot mode.	
Trigger source	Internal/external selectable	
Internal trigger oscillator	Period setting range: 100.0 µs to 10,000 s (5-digit/0.1 s)	
Stop level setting	The signal level while oscillation is stopped in the gated single-shot sweep mode is specified.  Setting range: –100.00% to +100.00% (with reference to the full scale of amplitude) or off	
Sweep input/output	Sweep sync/marker output, sweep X drive output, sweep external control input, and sweep external trigger input	

#### ▼ Burst/Trigger/Gate

Burst modes	Auto burst, trigger burst, gate, and triggered gate modes (The gate is turned on/off at each trigger in the triggered gate mode.)
Number of mark/space waves	0.5 to 999,999.5 cycles, in 0.5-cycle units
Number of oscillation waves in the gate mode	1 cycle/0.5 cycles selectable
Phase setting range	-1800.000° to +1800.000°
Stop level	The signal level while oscillation is stopped is specified.  Setting range: –100.00% to +100.00%  Oscillation stops at the set oscillation start/stop phase when the stop level is set to off.
Trigger source	Internal/external selectable, manual trigger allowed
Internal trigger oscillator	1.0 μs to 1,000 s (5-digit/0.1 μs)
Trigger delay	0.00 µs to 100.00 s (5-digit/0.01 µs) Except for latent delay. Valid in the trigger burst mode only.
External trigger input	TTL level Input impedance 10 kΩ (pulled up to +3.3 V) Unbalanced
Manual trigger	Panel key operation



#### **▼** Sequence

Step control parameters	Step time, hold operation, jump destination, number of jumps, step stop phase, branch operation, step termination control, and step sync code output
Channel parameters in step	Waveform, frequency, phase, amplitude, DC offset, and square wave duty
Available waveforms	Sine, square, noise, DC, and arbitrary waveforms     The ramp and parameter-variable waveforms can be used after being saved as arbitrary waveform.
Max. number of usable waveforms	128
Number of saved sequences	10 sequences (saved in the nonvolatile memory)
Number of steps	Up to 255 steps per sequence
Step time	0.1 ms to 1,000 s (4-digit/0.01 ms)
Operation in step	Constant, keep, and linear interpolation (except for waveform switching)
Number of jumps	1 to 999 or unlimited
Branch operation	Branched to the specified step when the branch signal is input.

#### ▼ 2-channel Ganged Operation (WF1974 only)

▼ 2-channel Ganged Operation (WF1974 only)		
Channel modes	Two channels independent, two phases (same frequency) constant frequency difference, constant frequency ratio, and differential output (same frequency, amplitude, DC offset, reversed waveform)	
Equivalent setting, same operation	Set two channels at the same time.	
Frequency difference setting range	0.00 μHz to less than 30 MHz (resolution: 0.01 μHz) CH2 frequency – CH1 frequency	
Frequency ratio N:M setting range	1 to 9,999,999 (for N and M, respectively) N:M = CH2 frequency:CH1 frequency	
Phase synchronization	Function to restart from the phase where the output waveforms for all the channels are set, automatic execution at channel mode switching	

#### **▼** Other Functions

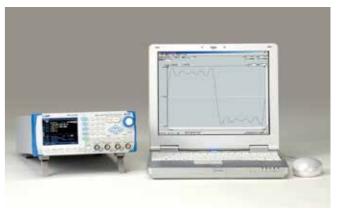
	External 10 MHz frequency reference input		Input voltage: 0.5 V <sub>p</sub> -p to 5 V <sub>p</sub> -p, sine or square waves
	Frequency reference output		For synchronization when more than one WF1973 and/or WF1974 are used. Output voltage: 1 Vp-p/50 $\Omega$ , square wave, 10 MHz
Ī	Ħ	Function	Function to add the external signal to the waveform output signal
	External addition input	Addition gain	x2/x10/off selectable The maximum output voltage range is fixed to 4 Vp-p (x2) or 20 Vp-p (x10).
	ternal a	Input voltage/ input frequency	-1 V to +1 V DC to 10 MHz (-3 dB)
	Ĕ	Input impedance	10 kΩ, unbalanced
[	Мι	ulti input/output	Used for sweep and sequence control
	Synchronization of multiple units		Sync operation is possible. Up to 6 units can be connected with BNC cables in the form of master/slave connections, using the frequency reference output and external 10 MHz frequency reference input.
	d unit	Function	Sets and displays the value in any unit, using a specified conversion expression.
	ine	Setting target	Frequency, period, amplitude, DC offset, phase, and duty
	User-defined	Conversion expression	[(setting target value)+n]×m or [log10 (setting target value)+n]×m The conversion expression, n and m are to be specified.
	l S	Unit character string	Up to four characters
	Memory to save setting		10 settings can be memorized (saved in the nonvolatile memory)
[	Interface		GPIB and USBTMC (SCPI-1999 and IEEE-488.2)

#### **▼** General Characteristics

Display	3.5" TFT color LCD			
Input/output ground	The signal grounds for waveform output, sync/sub output and external modulation/addition input are insulated from the housing. (These signal grounds are common within the same channel.) The signal ground for external 10 MHz frequency reference input is insulated from the housing. Each signal ground for CH1, CH2 and external 10 MHz frequency reference input is insulated from the housing.			
Power supply	AC100 V to 230 V ±10% (250 V max.) 50 Hz/60 Hz ±2 Hz			
Power consumption	WF1973: 50 VA max. WF1974: 75 VA max.			
Operation temperature/	0°C to +40°C, 5%RH to 85%RH			
humidity range	(Absolute humidity: 1 g/m³ to 25 g/m³, no condensation)			
Weight	Approx. 2.1 kg (main unit excluding accessories)			
Safety and EMC	Safety: EN 61010-1: 2010 EMC: EN 61326-1: 2013			
I Inless otherwise specifier	the value assumes the following conditions: continuous oscillation			

- Unless otherwise specified, the value assumes the following conditions: continuous oscillation, load of 50Ω, oscillation setting of 10 Vp-p/50, DC offset setting of 0 V, auto range, waveform amplitude range of FS, external addition turned off; the AC voltage is the rms value.
   \$1: Guaranteed numerical value. Other numerical values are nominal or typical (typ.) values.

- \*2: Used after converted into arbitrary waveform
  \*3: Conditions: 1 kHz Sine, Amplitude 20 mVp-p or greater/open



#### **▼** Sequence Editor

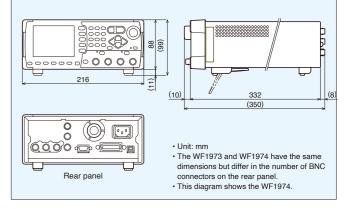
7 Coquento Lunto.						
Editing functions	<ul> <li>Initializes, copies, pastes, inserts, and deletes steps</li> <li>Saves and reads sequence data to/from a file</li> <li>Sequence can be edited without connecting the device.</li> </ul>					
Display functions	Editing screen: Lists parameters for each step.     Sequence view screen: Graphs changes of up to five parameters.					
Transfer functions	Transfers and reads sequence data to/from the device. Transfers to the device the arbitrary waveform used in the sequence.					
Device control functions	Output on/off Starts, stops, and holds the sequence. Can monitor the execution status of sequence.					
Operating environment	PC that can display 1024 x 768 (pixels) x 256 colors Microsoft Windows10 (32bit/64bit) USB interface NI-VISA from National Instruments USB driver (required)					

#### **▼** Arbitrary Waveform Editor

Editing functions	Generation (standard waveform and a mathematical expression) Interpolation (straight line, spline, and continuous spline) Math operation (addition, subtraction, multiplication, and division of waveform) Contraction and extension (vertical and horizontal directions) Cuts, copies, and pastes some part of waveform Undo function Saves and reads arbitrary waveform data to/from a file Waveforms can be edited without connecting the device.
Display functions	Zoom in/out     Scroll     Display unit (coordinates) selectable     Cursor (A, B)
Transfer function	Transfers and reads arbitrary waveform data to/from the device.
Device control function	Major parameter setting
Operating environment	*Same as the operating environment for the Sequence Editor.

Accessories	Instruction Manual (Basic)     CD     PDF manuals, Arbitrary Waveform Editor     Sequence Editor, LabVIEW driver     Power cord set
Option	Multi input/output cable (model name: PA-001-1318)

#### Dimensions







#### ■ WAVE FACTORY Lineup/Selection Guide

The following list summarizes the features of each model. For detailed specifications, refer to their respective catalogs, Web pages, or other documents.

			30 I	MHz		200	MHz	
Мо	del name	WF1973	WF1974	WF1947	WF1948	WF1967	WF1968	
Appearance		WF1974		WF1948		WF1968		
Oscillation frequency		0.01 μHz to 30 MHz		0.01 μHz to 30 MHz		0.01 μHz to 200 MHz		
Number of channels		1	2	1	2	1	2	
Vertical resolution for waveform		14 bits		16 bits		16 bits		
$\Box$	~	0.01 μHz to 30 MHz		0.01 μHz to 30 MHz		0.01 μHz to 200 MHz		
ည	<ul><li>☐ (duty fixed)</li><li>☐ (duty variable)</li></ul>	0.01 μHz to 15 MHz		0.01 μHz to 20 MHz		0.01 μHz to 70 MHz		
lank	^_	0.01 μHz to 15 MHz		0.01 μHz to 20 MHz		0.01 μHz to 70 MHz		
	√ (symmetry variable)	0.01 μHz to 5 MHz		0.01 μHz to 5 MHz		0.01 μHz to 20 MHz		
p	Parameter-variable waveforms (25 types)	0.01 μHz to 5 MHz		_		0.01 μHz to 20 MHz		
g	Arbitrary waveform	0.01 μHz to 5 MHz		0.01 μHz to 5 MHz		0.01 μHz to 20 MHz		
Wave	Noise	Bandwidth: 26 MHz		Bandwidth: 26 MHz		Equivalent bandwidth: Select from 100 M/30 M/10 M/3 M/1 M/300 k/100 kHz		
	quency setting resolution	0.01		μHz		0.01 µHz (< 50MHz), 0.1 µHz (50MHz ≤)		
Ris	ing/falling variable	Pulse: 15 ns to 58.8 Ms		Pulse: 15 ns to 62.5 Ms		Pulse: 4.21 ns to 58.8 Ms		
	itrary waveform data length/	4K words to				4 Ki words to 1 Mi words/		
	mber of waves			4 M words		128 waves, 4 Mi words*1		
$\overline{}$	ximum output voltage/resolution			50 Ω, Resolution: 0.1		· -		
l ⊢	Continuous oscillation	0	0	0	0	0	0	
	Burst/trigger/gate/ triggered gate	0	0	0	0	0	0	
	Sweep		Fred	l quency phase ampli	tude DC offset duty	ratio		
	Internal modulation	Frequency, phase, amplitude, DC offset, duty ratio  FM, FSK, PM, PSK, AM, DC offset and PWM						
Hat	External modulation	T INI, T OIX, T INI, T OIX, AINI, DO UISGE AND T WIN						
၂ ဟ ၂	Burst with modulation/ Sweep with modulation		_	_	_	0	0	
l ⊢	Sequence	0	0	_	_	0	0	
_	Two channel mode		0	_	0	_	0	
	nchronous operation	0	0	0	0	0	0	
	nclator function		<u> </u>	<u> </u>	<u> </u>	0	0	
	nchronization/sub-output			ulation sync/Sweep >		Sync signals/Internal modulation sync/ Sweep X drive/Sub output*3		
	ut/output floating	0	0	0	0	0	0	
	lation between channels	_	0	_	0	_	0	
External addition		<u> </u>	0	0	0	0	0	
GPIB interface		0	0	0	0	0	0	
USB interface		0	0	0	0	0	0	
Arbitrary Waveform Editor		0	0	0	0	0	0	
Sequence Editor		0	0			0	0	
Power supply		EO V/A!	75 \/\		50 V AC	GE \/A == !===	0E \/A -::	
Power consumption		50 VA or less	75 VA or less	50 VA or less	75 VA or less	65 VA or less	85 VA or less	
External dimensions (mm)*2		216 (W) × 88 (H) × 332 (D)		216 (W) × 132.5 (H) × 288 (D)		216 (W) × 132.5 (H) × 332 (D)		
Weight		approx. 2.1 kg		approx. 2.6 kg		approx. 3.0 kg		

<sup>\*1</sup> Ki and Mi represent 2<sup>10</sup>=1024 and 2<sup>20</sup>=1048576

Note: The contents of this catalog are current as of October 25th, 2024

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<sup>\*2</sup> Not including projections
\*3 Available waveform: sine, square (duty 50%), ramp (symmetry 50%), rising ramp, falling ramp, noise and arbitrary waveform.

Products appearance and specifications are subject to change without notice.
 Before purchase contact us to confirm the latest specifications, price and delivery date.