VOLTCRAFT

Dual-Channel
Arbitrary Waveform Generator
Quick Guide

- **FG-1302**
- **FG-1602**

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1. General Safety Requirement

Before any operations, please read the following safety precautions to avoid any possible bodily injury and prevent this product or any other products connected from damage. In order to avoid any contingent danger, this product is only used within the range specified.

Use Proper Power Cord. Use only the power cord supplied with the product and certified to use in your country.

Product Grounded. This instrument is grounded through the power cord grounding conductor. To avoid electric shock, the grounding conductor must be grounded. The product must be grounded properly before any connection with its input or output terminal.

Limit operation to the specified measurement category, voltage, or amperage ratings.

Check all Terminal Ratings. To avoid instrument damage and the risk of electric shock, check all the Measurement Limits and markers of this product. Refer to the user's manual for the Measurement Limits before connecting to the instrument. Do not exceed any of the Measurement Limits defined in the following section.

Do not operate without covers. Do not operate the instrument with covers or panels removed.

Use Proper Fuse. Use only the specified type and rating fuse for this instrument.

Avoid exposed circuit. Do not touch exposed junctions and components when the instrument is powered.

Do not operate if in any doubt. If you suspect damage occurs to the instrument, have it inspected by qualified service personnel before further operations.

Use your instrument in a well-ventilated area. Inadequate ventilation may cause increasing of temperature or damages to the device. Please keep well ventilated and inspect the intake regularly.

Do not operate in wet conditions. In order to avoid short circuiting to the interior of the device or electric shock, please do not operate in a humid environment.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry.

Only the qualified technicians can implement the maintenance.

2. Safety Terms and Symbols

Terms in this Manual. The following terms may appear in this manual:

Warning: Warning indicates the conditions or practices that could result in injury or loss of life.

Caution: Caution indicates the conditions or practices that could result in damage to this product or other property.

Terms on the Product. The following terms may appear on this product:

Danger: It indicates an injury or hazard may immediately happen.

Warning: It indicates an injury or hazard may be accessible potentially.

Caution: It indicates a potential damage to the instrument or other property might occur.

Safety Symbols

Symbols on the Product. The following symbol may appear on the product:


Hazardous Voltage


Refer to Manual


Protective Earth Terminal


Chassis Ground


Test Ground

3. General Inspection

After you get a new device, it is recommended that you should make a check on the instrument according to the following steps:

1. Check whether there is any damage caused by transportation.

If it is found that the packaging carton or the foamed plastic protection cushion has suffered serious damage, do not throw it away first till the complete device and its accessories succeed in the electrical and mechanical property tests.

2. Check the Accessories

The supplied accessories have been already described inAppendix A: Accessories of this manual. You can check whether there is any loss of accessories with reference to this description. If it is found that there is any accessory lost or damaged, please get in touch with our distributor responsible for this service or our local offices.

3. Check the Complete Instrument

If it is found that there is damage to the appearance of the instrument, or the instrument can not work normally, or fails in the performance test, please get in touch with our distributor responsible for this business or our local offices. If there is damage to the instrument caused by the transportation, please keep the package. With the transportation department or our distributor responsible for this business informed about it, a repairing or replacement of the instrument will be arranged by us.

4. Quick Start

Front panel overview

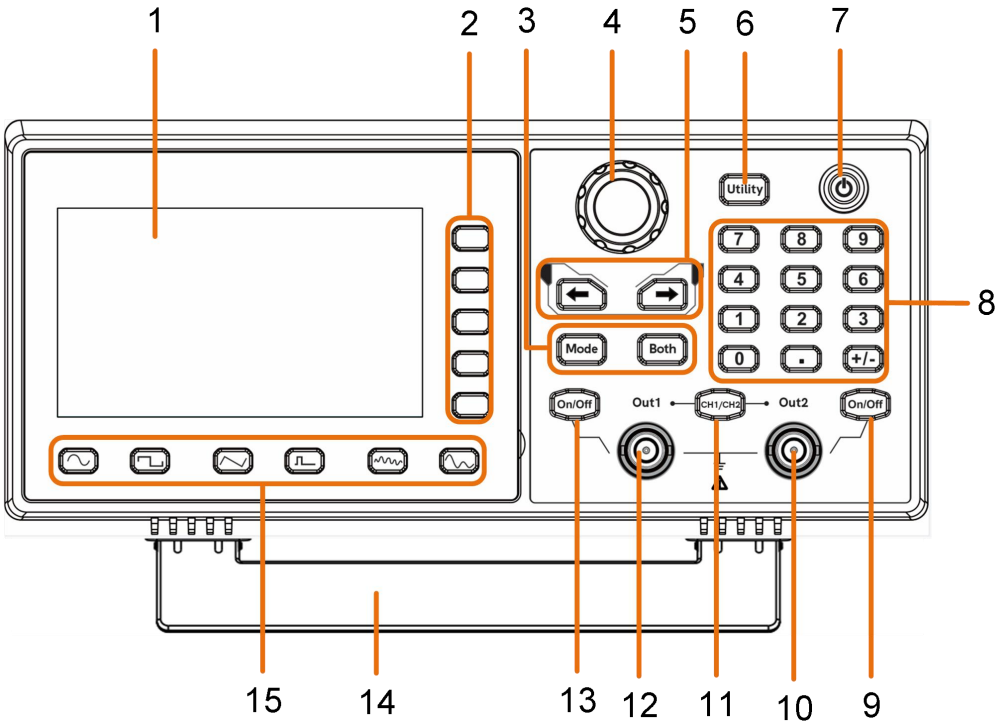


Figure 4- 1 Front Panel overview

1	**LCD**	Display the user interface
2	**Menu selection keys**	Includes 5 keys to activate the corresponding menu
3	**Mode keys**	**Mode**：output the modulated waveform **Both**：Display the editable parameters of both channels
4	**Knob**	Change the currently selected value, also used to select the arbitrary waveform types and ard data file name. When in the sweep or burst manual modes, press this konb to trigger manually
5	**Direction key**	Move the cursor of the selected parameter
6	**Operation keys(Utility)**	Set the utility function
7	**Power button**	Turn on/off the waveform generator.

8	**Number keypad**	Input the parameter
9	**On/Off button**	Turns the output of the CH2 channel on or off. When the output is turned on, the backlight of the button lights up
10	**Out 2**	Output CH2 signal
11	**CH1/CH2**	Switch channel displayed on the screen between CH1 and CH2
12	**Out 1**	Output CH1 signal
13	**On/Off button**	Turns the output of the CH1 channel on or off. When the output is turned on, the backlight of the button lights up
14	**Foot Stool**	Tilt the signal generator for easy operation
15	**Waveform Selection area**	Includes: Sine, Square, Ramp, Pulse, Noise, Arb Wave.

Rear Panel Overview

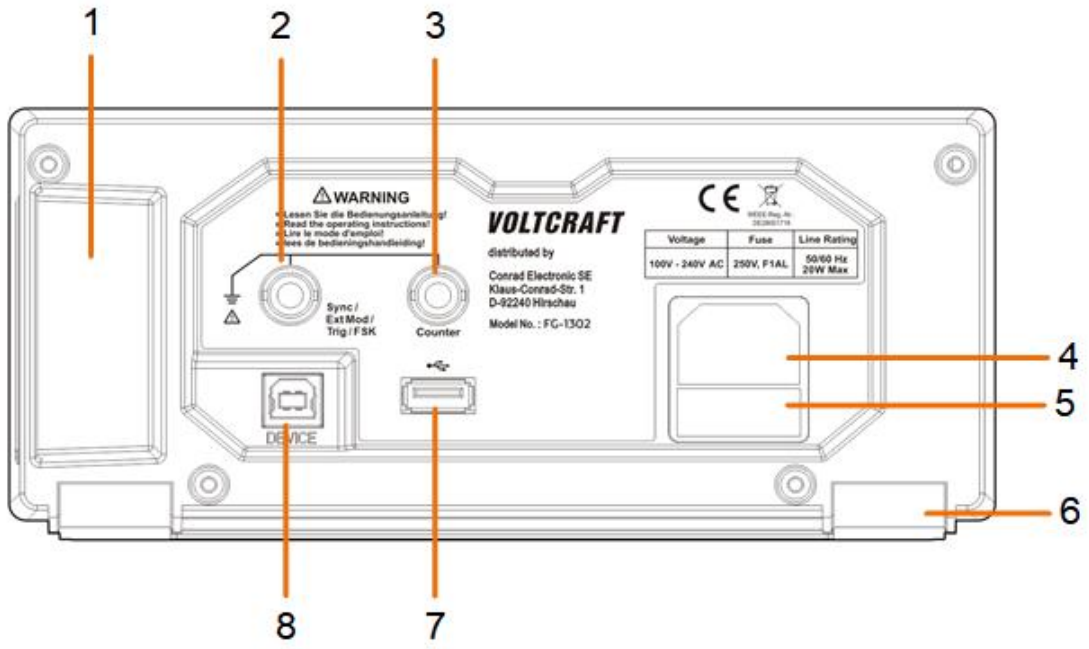


Figure 4- 2 Rear Panel Overview

1	**Handle**

2	**Signal connector**	Used to connect the input or output of a functional signal
3	**Counter input**	Used to receive the frequency meter input signal
4	**AC input connector**	AC input connector
5	**Fuse Container**	The place to install the fuse
6	**Foot Pad**	Tilt the signal generator for easy operation
7	**USB interface**	Connect with external USB devices, e.g. USB stick
8	**USB Device interface**	Used to connect a USB type B controller. Can be connected with PC, the signal generator can be controlled by the host computer software

Power on

(1) Connect the instrument to an AC power source using the power cord supplied with the accessory.

> **Warning:**
> To prevent electric shock, make sure the instrument is properly grounded.

(2) Press the **power button** on the front panel. The backlight of the power channel switch will light up, and the buzzer will sound.

User Interface

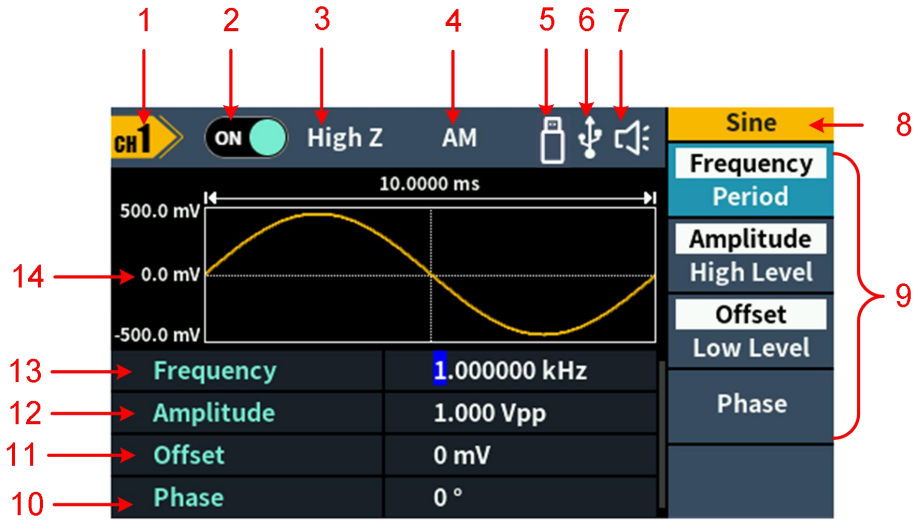


Figure 4- 3 User Interface

1	Display channel name
2	Display channel switch status
3	Display load
4	Current mode
5	When the instrument detects the USB flash drive, it lights up
6	Lights up the indicator when connected to the USB Host via the USB DEVICE interface
7	Buzzer
8	Menu title
9	Current waveform or mode setting menu
10	Start phase
11	Offset / low level, depending on the right highlighted menu
12	Amplitude / high level, depending on the right highlighted menu item
13	Frequency/Period, depending on the highlighted menu item
14	Display current waveform

Set the channel

- **Select the channel for configuration**

Before configuring waveform parameters, you must first select the channel you want to configure. Press **CH1** /**CH2** to switch to the desired channel and the user interface.

- **To Display/Edit Both Channels**

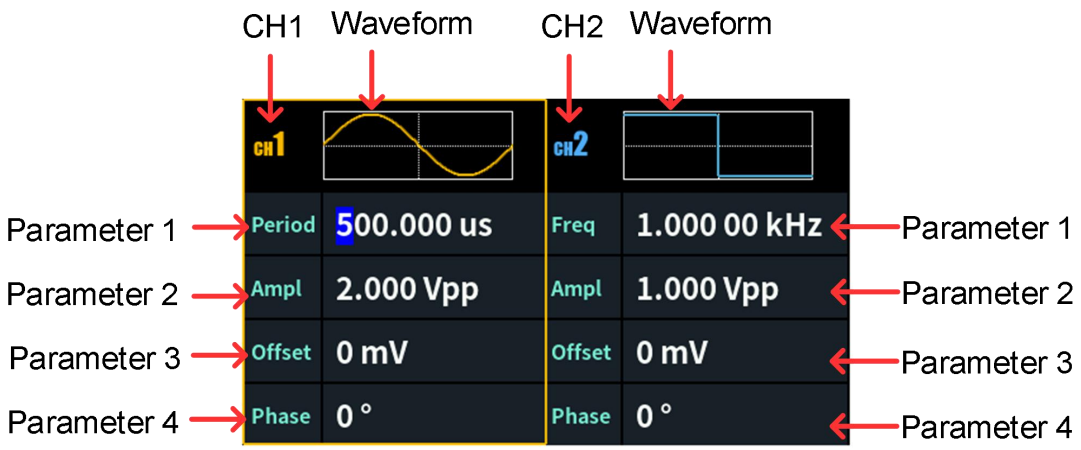
Press **Both** button to display the parameters of both channels.

To switch channel: Press **CH1/CH2** to switch the editable channel.

To select waveform: Press **Waveform selection buttons** to select waveform of current channel.

To select parameter: Press **Menu selection keys** to choose the **Parameter 1** to **Parameter 4**（**Corresponding keys 2-5**）;Press it again to switch the current parameter such as Frequency/Period.

To edit parameter: Turn the **knob** to change the value of cursor position. Press ←/→ direction key to move the cursor. (The number keys can not be used to input.)



- **Turn on/off channel output**

Press CH1 **On/Off** or CH2 **On/Off** on the front panel to turn on/off the corresponding channel output. The channel will light up when it is set to output.

Set basic waveform

Can set and output the Sine, Square, Ramp, Pulse, Noise or Arbitrary waveform. Press the waveform selection button on the front panel of the instrument: sine, square, ramp, pulse, noise, arbitrary, and enter the corresponding waveform setting interface. The waveform is different and the parameters that can be set are different.

Example: Press the key and press the Frequency/Period soft key. The selected menu item is highlighted on white, and the cursor will display on corresponding parameter item in the user interface. Press the Frequency/Period softkey to switch the frequency/period.

There are two ways to change the selected parameter value:

- Turn the Knob to increase or decrease the value at the cursor. Press the direction keys to move the cursor left or right.
- Press a **number key** on the numeric keypad directly, the screen will pop out of the data input box, continue to input the desired value.Press the right menu soft key to select the unit of the parameter. Press the Back softkey to cancel the current entry.



Figure 4-4：Use numeric keypad to set the frequency

Parameters of waveforms

Waveform	Menu Items
Sine	Frequency/Period, Amplitude/High Level, Offset/Low Level, Phase
Square	Frequency/Period, Amplitude/High Level, Offset/Low Level, Phase
Ramp	Frequency/Period, Amplitude/High Level, Offset/Low Level, Phase Symmetry
Pulse	Frequency/Period, Amplitude/ High Level, Offset/Low Level, Phase, Width/Duty, Rise,Fall
Noise	Amplitude/High Level, Offset/Low Level
Arbitrary	Frequency/Period, Amplitude/High Level, Offset/Low Level, Phase, Bult-in,Store

Output the build-in waveform (including DC)

(1) Press the arbitrary wave button, then press the NextPage ,to the nextpage menu.

(2) Press the **Built-in** softkey,go to the build-in waveform and select the menu。

(3) Press the Common, Medical Treatment, Standard softkeys to select the build-in waveform mode：

Press the NextPage softkeys, to select the build-in waveform：Maths, Trigonometric, Window.

Press the NextPage softkeys, to select the build-in waveform：Engineering, Seg Mod, Fan test.

Note: DC is a type of built-in waveform, located in the "Common" category, named "DC".

Generate the Modulated Waveform

Supported modulation types include: AM (Amplitude Modulation), FM (Frequency Modulation), PM (Phase Modulation), PWM (Pulse Width Modulation), ASK (Amplitude Shift Keying), PSK (Phase Shift Keying), FSK (Frequency Shift Keying), 3FSK (Ternary Frequency Shift Keying), 4FSK (Quadrature Frequency Shift Keying), BPSK (Biphase Phase Shift Keying), QPSK (Quadrature Phase Shift Keying), OSK (Oscillating Keying), SUM (Sum Modulation), DSBAM (Double-Sideband Amplitude Modulation) , Sweep and Brust.

Press the **Mode** function key, to select the modulation type enter the setup menu. To turn off the modulation, press the **Mode** function button again.

Parameters of modulated waveforms:

Type	Parameters	
AM	Internal source	Shape, Frequency, Depth
	External source	None
FM	Internal source	Shape, Frequency, Deviation
	External source	Deviation
PM	Internal source	Shape, Frequency, Deviation
	External source	Deviation
PWM	Internal source	Shape, Rate, Deviation
	External source	Deviation
ASK	Internal source	Rate, Amplitude
	External source	Amplitude
PSK	Internal source	Rate, Deviation
	External source	Deviation
FSK	Internal source	Rate, HopFreq
	External source	HopFreq
3FSK	Rate, HopFreq 1, HopFreq 2	
4FSK	Rate, HopFreq 1, HopFreq 2, HopFreq 3	
BPSK	Rate, Deviation, DataSource	
QPSK	Rate, Phase1, Phase2, Phase3	
OSK	Internal source	Frequency, OscTime
SUM	Internal source	Shape, Frequency, Depth
	External source	None
DSBAM	Internal source	Shape, Frequency, Depth
	External source	None
Sweep	Internal source External source	Linear/Log, Sweep Time, Start Freq/Center

	Manual source	Freq, Stop Freq/Freq Span
Burst	Internal source	Burst Period, N_Cycle/Gated, Cycles/Infinite
	External source	N_Cycle/Gated, Cycles/Infinite

Generate Sweep

In the frequency sweep mode, the generator "steps" from the start frequency to the stop frequency at the sweep rate you specify. Sweep can be generated by Sine, Square, Ramp or Arbitrary waveforms.

When the output signal is Sine, Square, Ramp or Arbitrary waveform, press the front panel **Mode** key ,then press the **Sweep** to enter the sweep mode. The parameters allowed to be set are: Sweep Time, Linear/Log, Start Frequency/Center Frequency, Stop Frequency/Frequency Span, Source.

Generate Burst

Press the **Mode** function key, then press the **Burst** enter burst mode, to generate versatile waveforms in burst.Burst can last for certain times of waveform cycle (N-Cycle Burst). Bust can apply to Sine, Square, Ramp, Pulse and Arbitrary waveforms.The parameters allowed to be set are: Burst Period, Cycles/Infinite and Trigger source.

Store

Users can Load customized waveform to the device by PC software. Install PC software first. (You may follow P15 "Communication with PC"). Press  , press **NextPage** then Store button to enter File system.

Reading waveform

(1) Please visit our official website to obtain the installation package and decompress it.

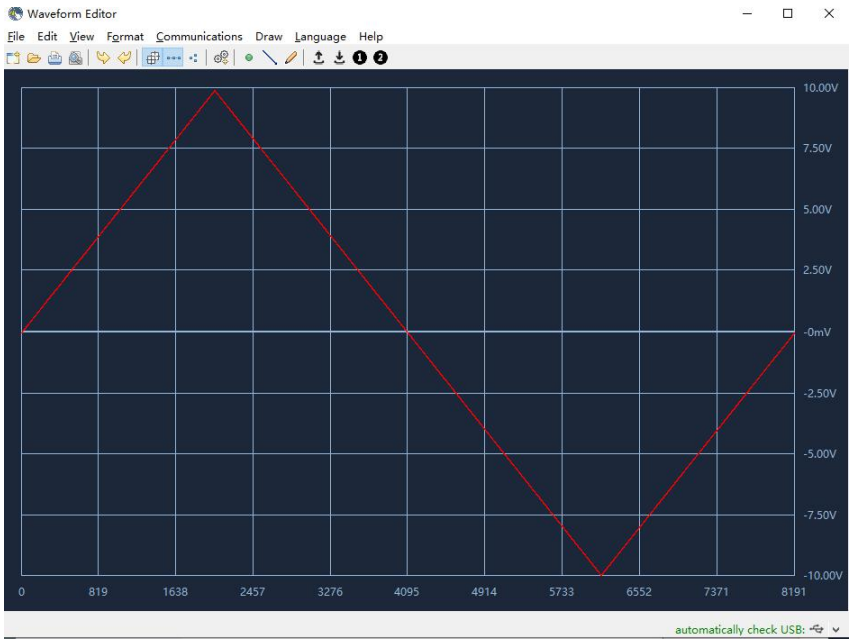
(2) Double click "Waveform Editor " icon to run the software.



(3) Enter the “Waveform Editor” interface.

(4) Select the required waveform on the instrument.

(5) Under Waveform Editor software interface, click "Read Waveform Icon " button, and the waveform will be read and displayed on the screen.



Write and Recall waveform

We can use the Line Draw, Hand Draw and Point Edit mode in the Waveform Editor to edit the required waveform, and save and display it on the instrument by writing.

(1) Under Waveform Editor software interface, Click "Write waveform Icon " button.

(2) After the writing is successful, the "file download finish" prompt box will be displayed in the waveform editor. Click "OK".

(3) On the instrument, the screen shows "Any wave has been updated to USERX(X is 0-15)".

(4) Press the Arb Wave button ,then press the **NextPage** button to enter the nextpage menu.

(5) Press the **Store** soft key to enter the file system, and then press the **Enter** soft key to enter the file system. Select the file name “USERX” that has just written the waveform.

(6) Press the **Call out** soft key, the screen displays "File read successfully", then press the arbitrary wave key, the written waveform can be

viewed on the instrument.

Note: The file size is displayed on the right of the file. If 0B is displayed, the file is empty.

Utility Setting

Press the front panel **Utility** function key to enter the system options menu. The user can set the display parameters of the signal generator, CH1/2 parameters, interface parameters and system parameters. Press **Utility** again to exit the system options menu.

Utility system menu

Menu	Description
Display Setting	
Backlight	Set the parameter value of the screen brightness
Screen saver	Set the On/Off screen saver；If set to ON, the screen saver time range can be 1 to 999 minutes
Separator	Set the separator for the screen display data
CH1/2 Setting	
CH1 Load	It is convenient for the user to match the display voltage with the desired load. The range is from 1 Ω to 10 kΩ
CH2 Load	
Sync	Enable/disable sync output terminal to output sync signal
Align Phase	Set the phase of the output signals of the two channels to be consistent
System Setting	
Language	Only English supported.
Beeper	If On, it makes sounds when prompted
USB Device	Set the communication protocol type of the USB Device interface on the rear panel. **PC:** This is the internal communication protocol. Select this option when connecting to the Waveform Editor software running on computer via the USB Device interface. **USBTMC:** Select this when you need to use the USBTMC communication protocol standard.
Factory Set	Factory restoration
Upgrade	The instrument firmware can be updated using a USB storage device through the rear panel USB interface.
Counter Setting	
HF Rejection	Enable/disable high frequency rejection.

Counter

The frequency counter measures signals in the frequency range from 100 mHz to 200 MHz. The **[Counter]** connector on the rear panel is used by default to receive the frequency counter input signal. The frequency meter works from

the start.

(1) Press the **Utility** function key ,then press the **Counter** to enter the frequency counter interface.

(2) Connect the signal to be tested to the **[Counter]** connector on the rear panel.

(3) Press the HFR softkey to toggle On or Off high frequency rejection. High-frequency rejection can be used to filter high-frequency factors when measuring low-frequency signals, improving measurement accuracy. When measuring low frequency signals with a frequency less than 1 kHz, turn on high frequency rejection to filter out high frequency noise interference; turn off high frequency rejection when measuring high frequency signals with frequencies greater than 1 kHz.

(4) The frequency, period and duty cycle can be viewed on the frequency meter interface.Appendix

Communication with PC

Supports communication with a computer via a USB port. Using the Waveform Editor software installed on the computer, the signal generator can be operated on the computer to control the output and write of the signal generator.

The instrument settings can be saved as files in internal memory. Up to 16 instrument settings can be saved in the instrument internal memory.

Note: Please go to our official website to obtain the Waveform Edito communication software and install it.

(1) **Set the USB device protocol type of the signal generator**: Press **Utility** →System → USBDev, switch to PC.

(2) **Connection:** Connect the USB Device interface on the rear panel of the signal generator to the **USB interface** of the computer with a USB cable.

(3) **Install the driver:** Run Waveform Editor software on the computer. Follow the instructions to install the driver. The path of the driver is the USBDRV folder in the directory where the Waveform Editor communication software is located, such as "C:\Program Files (x86)\DS_Wave\Waveform Editor\USBDRV".

(4) **Host computer communication port setting:** Open the Waveform Editor software, click “Communications” in the menu bar, select “Ports-Settings”, in the setting dialog box, select the communication port as “USB”. After the connection is successful, the connection status prompt in the lower right corner of the software interface turns green.

Appendix A：Accessories

- 1 × power cord that meets the standards of the country where you are located
- 1 × USB communication cable
- 1 × BNC/Q9 cable
- 1 x BNC to alligator cable
- 1 x extra fuse
- 1 × EN Quick Guide
- 1 × DE Quick Guide
- 1 x safety hintsheet

Appendix B：General Care and Cleaning

General Maintenance

Do not store or leave the instrument where the liquid crystal display will be exposed to direct sunlight for long periods of time.

Caution: To avoid any damage to the instrument or probe, do not exposed it to any sprays, liquids, or solvents.

Cleaning

Inspect the instrument and probes as often as operating conditions require. To clean the instrument exterior, perform the following steps:

1. Wipe the dust from the instrument and probe surface with a soft cloth. Do not make any scuffing on the transparent LCD protection screen when clean the LCD screen.
2. Disconnect power before cleaning your instrument. Clean the instrument with a wet soft cloth not dripping water. It is recommended to scrub with soft detergent or fresh water. To avoid damage to the instrument or probe, do not use any corrosive chemical cleaning agent

Warning: Before power on again for operation, it is required to confirm that the instrument has already been dried completely, avoiding any electrical short circuit or bodily injury resulting form the moisture.