

Set modulation waveform

The instrument can receive modulation signals from internal or external sources as modulation sources. Click **modulation source** drop-down menu, you can select "Inside" "External Source" or "External Source".

• Internal sources

After selecting "Internal Source" the user can click **modulation waveform** select the modulation waveform from the drop-down menu of the item. The available waveforms include:

- sine wave
- Square wave: 50% duty cycle
- Triangular wave: 50% symmetry
- Upper sawtooth: 100% symmetry
- Lower sawtooth: 0% symmetry
- Noise: Gaussian white noise
- Arbitrary wave: standard arbitrary wave except DC. The carrier wave and internal modulation waveform are not supported to be arbitrary waves at the same time.

• external sources

After selecting "External Source", **modulation waveform** and **modulation frequency** is grayed out and disabled. The instrument accepts input from the corresponding channel on the rear panel.

[AUX IN/OUT] Connector input for external modulated signal. At this time, the PM modulation amplitude is controlled by the ± 5 V signal level on this connector.

Set modulation frequency

After selecting the internal modulation source, click **modulation frequency** in the input box, set the modulation wave frequency through the pop-up virtual numeric keyboard. Can Set the range to 2 mHz~1 MHz, the default is 100 Hz, and the resolution is 1 μ Hz.

hint

When an external modulation source is selected, this parameter is grayed out and unavailable.

Set phase deviation

The phase deviation represents the maximum change in phase between the modulated waveform and the carrier wave. **phase deviation** Item input box, set phase deviation. The setting range of phase deviation is $0^\circ \sim 360^\circ$, the default value is 90° , and the resolution is 0.01° .

When an external modulation source is selected, the phase offset is determined by the corresponding channel on the rear panel. **[AUX IN/OUT]** ± 5 V signal level control on connector. For example, if the phase deviation is set to 180° , then a +5 V signal level corresponds to a 180° change in phase. Lower external signal levels produce less deviation.

6.4

Amplitude shift keying (ASK)

When using ASK (Amplitude Shift Keying) modulation, you can configure the output signal to "shift" its output amplitude between two preset amplitudes ("carrier amplitude" and "modulation amplitude"). In the "Modulation Settings Interface" ([Figure 6.1](#)) Click "Adjust

Select the drop-down menu of "Modulation Mode" item, select the modulation mode as "Amplitude Shift Keying", and then set other modulation parameters according to the following content.

Select and set carrier

ASK carrier waveform can be sine wave, square wave, sawtooth wave and arbitrary waveform (except DC), and the default is sine wave. Click the "Waveform Type" item drop-down menu, or press the waveform selection key on the front panel to select the carrier waveform.

Click on the carrier wave (continuous wave) setting interface **Amplitude/high level** Switch key to switch to amplitude setting. Click the corresponding input box to pass Set the carrier amplitude through the pop-up virtual numeric keyboard. Please refer to the carrier amplitude setting method and setting range. *continuous wave*.

modulation source

The instrument can receive modulation signals from internal or external sources as modulation sources. Click **modulation source** drop-down menu, you can select "Inside" "External Source" or "External Source".

• Internal sources

When "Internal Source" is selected, the instrument uses a square wave with a duty cycle of 50% as the ASK modulation source. At this time, the output amplitude "moves" between "carrier amplitude" and "modulation amplitude", and the moving frequency is determined by the "modulation rate".

• external sources

When "External Source" is selected, the signal generator receives the signal from the corresponding channel on the rear panel. **AUX IN/OUT** Connector input external modulation signal.

Set ASK modulation rate

The ASK modulation rate is the rate at which the output amplitude "shifts" between the carrier amplitude and the modulation amplitude when using an internal modulation source. Click

modulation rate In the input box, set the ASK rate through the pop-up virtual numeric keyboard. The range can be set to 2 mHz~1 MHz, default is 100 Hz, resolution 1 μ Hz.

hint

When an external modulation source is selected, this parameter is grayed out and unavailable.

Set modulation amplitude

Click **modulation amplitude** in the input box of the item, set the modulation amplitude through the pop-up virtual numeric keyboard. The modulation amplitude can be set within the range of

The underlying waveform amplitude range is consistent (see *Table 5.2: Amplitude setting range*), the default is 2 Vpp.

Set polarity

Click **polarity** In the drop-down menu of the item, select the "positive polarity" or "negative polarity" of the modulation wave to control the amplitude output. The default is "Positive polarity".

• **Positive polarity:** The carrier amplitude is output when the internal/external modulation signal is at a logic low level, and the modulation amplitude is output when the logic level is high.

• **Negative polarity:** The modulation amplitude is output when the internal/external modulation signal is at a logic low level, and the carrier amplitude is output when the logic level is high.



6.5

Frequency shift keying (FSK)

When using FSK (Frequency Shift Keying) modulation, you can configure the signal generator to "shift" its output frequency between two preset frequencies ("carrier frequency" and "frequency hopping"). In the "Modulation Settings Interface" (*Figure 6.1*) Click the drop-down menu of the "Modulation Mode" item, select the modulation mode as "Frequency Shift Keying", and then set other modulation parameters according to the following content.

Select and set carrier

The FSK carrier waveform can be sine wave, square wave, sawtooth wave and arbitrary waveform (except DC), and the default is sine wave. Click the "Waveform Type" item drop-down menu, or press the waveform selection key on the front panel to select the carrier waveform.

Click on the carrier wave (continuous wave) setting interface **frequency/period** Switch key to switch to frequency setting. Click the corresponding input box to pass the pop-up virtual numeric keyboard sets the carrier frequency. Different carrier waveforms have different settable frequency ranges, please refer to *continuous wave*.

modulation source

The instrument can receive modulation signals from internal or external sources as modulation sources. Click **modulation source** drop-down menu, you can select "Inside External Source" or "External Source".

• Internal sources

When "Internal Source" is selected, the instrument uses a square wave with a duty cycle of 50% as the FSK modulation source. At this time, the output frequency "moves" between "carrier frequency" and "hopping frequency", and the moving frequency is determined by the "modulation rate".

• external sources

When "External Source" is selected, the signal generator receives the signal from the corresponding channel on the rear panel. **[AUX IN/OUT]** Connector input external modulation signal.

Set FSK modulation rate

The FSK modulation rate is the rate at which the output frequency "shifts" between the carrier frequency and the hop frequency when using an internal modulation source.

Click **modulation rate** In the input box, set the FSK modulation rate through the pop-up virtual numeric keyboard. The range can be set to 2 mHz~1 MHz, default is 100 Hz.

hint

When an external modulation source is selected, this parameter is grayed out and unavailable.

Set hop frequency

Click **frequency hopping** input box, set the jumping frequency through the pop-up virtual numeric keyboard. Jump frequency range and instrument model and wave

For details about shape types, please refer to *Table 5.1: Continuous waveform frequency setting range*.

Set polarity

Click **polarity** In the drop-down menu of the item, select the "positive polarity" or "negative polarity" of the modulation wave to control the frequency output. The default is "Positive polarity".

• **Positive polarity:** The carrier frequency is output when the internal/external modulation signal is at a logic low level, and the jump frequency is output when the logic level is high.

• **Negative polarity:** When the internal/external modulation signal is at a logic low level, the jump frequency is output, and when the logic level is at a high level, the carrier frequency is output.



6.6

Phase shift keying (PSK)

When using PSK (Phase Shift Keying) modulation, you can configure the signal generator to "shift" its output phase between two preset phases ("carrier phase" and "modulation phase"). In the "Modulation Settings Interface" (*Figure 6.1*) Click the drop-down menu of the "Modulation Mode" item, select the modulation mode as "Phase Shift Keying", and then set other modulation parameters according to the following content.

Select and set carrier

PSK carrier waveform can be sine wave, square wave, sawtooth wave and arbitrary wave (except DC), and the default is sine wave. Click the "Waveform Type" item drop-down menu, or press the waveform selection key on the front panel to select the carrier waveform.

In the carrier wave (continuous wave) setting interface, click the "Phase" item input box and set the starting phase through the pop-up virtual numeric keyboard. The settable range is -360° ~ 360° , the default is 0° , and the resolution is 0.01° .

modulation source

The instrument can receive modulation signals from internal or external sources as modulation sources. Click **modulation source** drop-down menu, you can select "Inside External Source" or "External Source".

• Internal sources

When "Internal Source" is selected, the instrument uses a square wave with a duty cycle of 50% as the PSK modulation source. At this time, the output phase "moves" between "carrier phase" and "modulation phase", and the frequency of movement is determined by the "modulation rate".

• external sources

When "External Source" is selected, the signal generator receives the signal from the corresponding channel on the rear panel. **[AUX IN/OUT]** Connector input external modulation signal.

Set PSK modulation rate

The PSK modulation rate is the rate at which the output phase "shifts" between the carrier phase and the modulation phase when using an internal modulation source. Click

modulation rate In the input box, set the PSK rate through the pop-up virtual numeric keyboard. The settable range is 2 mHz~1 MHz, default is 100 Hz, resolution 1 μ Hz.

hint

When an external modulation source is selected, this parameter is grayed out and unavailable.

Set modulation phase

Click **Phase** In the input box, set the phase of the modulation wave through the pop-up virtual numeric keyboard. The phase can be set within the range 0° ~ 360° , default is 180° , resolution 0.01° .

Set polarity

Click **polarity** In the drop-down menu of the item, select the "positive polarity" or "negative polarity" of the modulated wave to control the phase output. The default is "Positive polarity".

• **Positive polarity:** The carrier phase is output when the internal/external modulation signal is at a logic low level, and the modulation phase is output when the logic level is high.

• **Negative polarity:** The modulation phase is output when the internal/external modulation signal is at a logic low level, and the carrier phase is output when the logic level is high.



6.7

Pulse Width Modulation (PWM)

When using PWM (Pulse Width Modulation) modulation, the pulse width of the output signal changes with the change of the instantaneous voltage of the modulation waveform, and the amount of change is called the width deviation.

hint

To select the PWM modulation type, you must first select "Pulse" in the "Waveform Type" drop-down menu. When "Output Mode" selects "Modulation", the modulation method will automatically select Pulse Width Modulation. Please refer to the following content for other modulation parameter settings.

Select and set carrier

PWM can only be used to modulate pulse waves. Click the "Waveform Type" item drop-down menu and select "Pulse", or press



Select the carrier waveform as pulse wave. Note that the built-in "pulse" in "arbitrary wave" cannot be used as a carrier wave.

Please refer to the pulse wave width/duty cycle setting [Output pulse wave](#).

Select modulation source

The instrument can receive modulation signals from internal or external sources as modulation sources. Click **modulation source** drop-down menu of items to select "Internal Source" or "External Source".

• Internal sources

After selecting "Internal Source" the user can click **modulation waveform** select the modulation waveform from the drop-down menu of the item. The available waveforms include:

- sine wave
- Square wave: duty cycle 50%
- Triangular wave: 50% symmetry
- Upward sawtooth: 100% symmetry
- Downward sawtooth: 0% symmetry
- Noise: Gaussian white noise
- Arbitrary wave: standard arbitrary wave except DC.

• external sources

After selecting "External Source", **modulation waveform** and **modulation frequency** are grayed out and disabled. The instrument receives the signal from the corresponding channel on the rear panel.

[AUX IN/OUT] Connector input for external modulated signal. At this time, the PWM modulation amplitude is controlled by the ± 5 V signal level on this connector.

Set modulation frequency

After selecting the internal modulation source, click **modulation frequency** in the input box, set the modulation wave frequency through the pop-up virtual numeric keyboard. Can

Set the range to 2 mHz~1 MHz, and the default is 100 Hz.



hint

This parameter is not available when an external modulation source is selected.

Set width/duty cycle deviation

PWM deviation refers to the variation in the width of the modulated pulse waveform. The PWM deviation can be set using time (width deviation) or duty cycle (duty cycle deviation). The setting method used is the same as the one selected in the carrier wave (pulse wave). *Pulse width/duty cycle* settings accordingly. For example, when the pulse wave *Pulse width/duty cycle* When "Pulse Width" is selected in "Pulse Width", the PWM deviation setting will automatically switch to "Width Deviation".

• Width deviation

Specifies the change in pulse width of the modulated waveform relative to the original pulse waveform, in units of time. For example, if the pulse waveform pulse width is specified as 10 s and the width deviation is set to 5 s, then under the control of the modulation signal, the pulse width of the modulated signal changes between 5 s and 15 s.

Click **Duty cycle deviation/width deviation** Switch key to switch to the width deviation setting. At this time, the "width deviation" button is on the switch key.

Highlight it, click the corresponding input box, and set the width deviation value. The width deviation setting range is limited by the pulse width and pulse period of the pulse waveform:

- Width deviation \leq (pulse width-9 ns).
- Width deviation \leq (pulse period-pulse width-9 ns).

• Duty cycle deviation

Specifies the amount of change in pulse width of the modulated waveform relative to the original pulse waveform, in percent of the waveform period. For example, if the pulse waveform duty cycle is specified as 10% and the duty cycle deviation is set to 5%, then under the control of the modulation signal, the duty cycle of the modulated signal varies between 5% and 15%.

Click **Duty cycle deviation/width deviation** Switch key to switch to the duty cycle deviation setting. At this time, the "Duty Cycle Deviation" button on the switch key

"Difference" is highlighted, click the corresponding input box to set the duty cycle deviation value. The duty cycle deviation setting range is

0%~49.99%, and is affected by the duty cycle and period limit of the pulse waveform.

When selecting an external modulation source, the width deviation (or duty cycle deviation) is determined by the corresponding channel on the rear panel. [

AUX IN/OUT] ± 5 V signal level control on connector. For example, if the width deviation is set to 10 s, a +5 V signal level corresponds to a 10 s change in width.

6.8

Waveform superposition (SUM)

When the waveform superposition function is turned on, the user can superimpose the specified waveform on the current basic wave. In the "Modulation Settings Interface" (

Figure 6.7) Click the drop-down menu of the "Modulation Mode" item, select the modulation mode as "Overlay", and then set other parameters according to the following content.

Select and set carrier

The carrier waveform can be sine wave, square wave, sawtooth wave and arbitrary wave (except DC), and the default is sine wave. Click the "Waveform Type" item drop-down menu, or press the corresponding waveform selection key on the front panel to select the carrier waveform. Enter the carrier setting interface, refer to *continuous wave*. One section sets the waveform parameters of the carrier.

Set up overlay waveform

Click **Overlay waveform** drop-down menu to select the waveform to be superimposed on the current basic wave. Optional waveforms include:

- sine wave
- Square wave: 50% duty cycle
- Sawtooth: 50% symmetry
- Noise: Gaussian white noise
- Arbitrary wave: standard arbitrary wave except DC.
- Channel 1/Channel 2: Waveform of the other channel.

Set overlay frequency

Sets the frequency of the waveform superimposed on the current continuous wave. Click **Superposition frequency** input box on the right, through the pop-up virtual keyboard Enter the desired value. The settable range is related to the currently selected waveform.

Set overlay ratio

Set the percentage of the waveform amplitude superimposed on the current continuous wave to the current continuous wave **Overlay ratio** Parameters on the right amplitude. Click the input box and enter the required value through the pop-up virtual keyboard. The default is 50%.

7

Sweep

In frequency sweep mode, the signal generator changes its output from the start frequency to the end frequency within the specified sweep time; it supports three sweep modes: linear, logarithmic and step, from low frequency to high frequency, or from high frequency to low frequency. Sweep output; allows user to set "marker" frequency; allows user to set start hold, end hold, and return times; supports internal, external, or manual trigger sources; for sine, square, sawtooth, and arbitrary waveforms (except DC), both can produce sweep output.

Click the "Output Mode" drop-down menu on the user interface, select "Sweep", enable the frequency sweep function and enter the sweep setting interface, as shown in the figure below. You can click the tab at the bottom of the interface to enter the continuous wave setting interface, frequency sweep setting interface or channel setting interface. Please refer to the continuous wave setting and channel setting respectively. [continuous wave](#) and [Channel settings](#); this section only introduces the frequency sweep settings.



Figure 7.1 Frequency sweep setting interface

7.1

Sweep type

DG900 Pro provides three frequency sweep modes: linear, logarithmic and step. The default is linear sweep. Click the "Sweep Type" drop-down menu to select "Linear Sweep", "Logarithmic Sweep" or "Step Sweep".

linear sweep

During the sweep, the instrument changes the output frequency in a linear manner, that is, by "several Hertz per second". This change is controlled by the "Start Frequency", "End Frequency" and "Sweep Time".

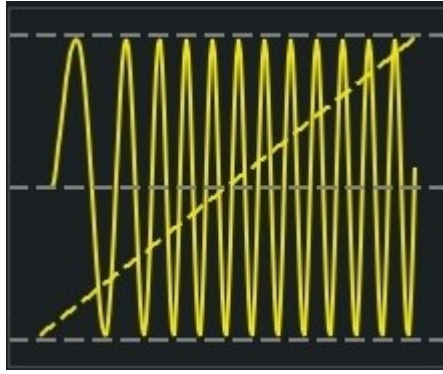


Figure 7.2 Linear frequency sweep

Logarithmic sweep

During the sweep, the instrument changes the output frequency in a logarithmic manner, that is, in an "octave per second" or "ten times per second" manner. The change is composed of "start frequency", "end frequency" and "sweep frequency". time control.

The function prototype of logarithmic sweep is $F = P \cdot t$, parameter P and T Use the starting frequency (F_{start}), end frequency (F_{stop}) and sweep time (T_{sweep}) Expressed as:

$$P = 10^{\lg(F_{stop}/F_{start})/T_{sweep}}$$

$$T = t + \lg(F_{start})/\lg(P)$$

in, t is the time elapsed from the start of frequency sweep, ranging from 0 to T_{sweep} between, F is the instantaneous frequency of the current output.

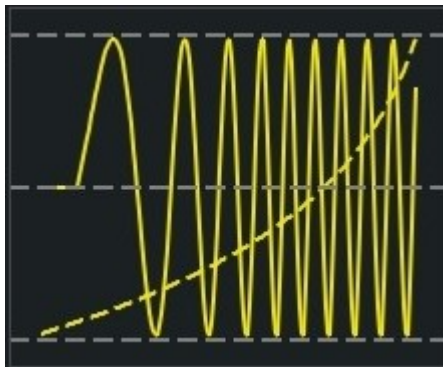


Figure 7.3 Logarithmic sweep

step sweep

During the sweep, the instrument changes the output frequency in a stepped "step" manner. The length of time the output signal stays at each frequency point is controlled by the "sweep time" and "number of steps".

When "Step Sweep" is selected, click **number of steps**. The input box of the item, sets the number of steps. The settable range is 2~1024, default is 2.

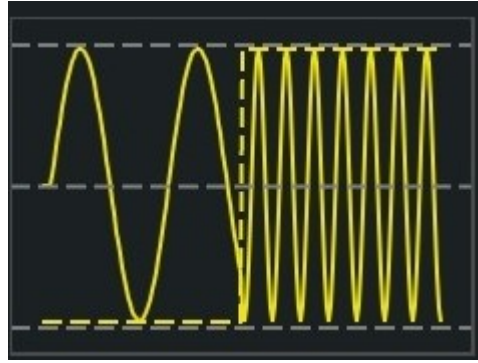


Figure 7.4 Step frequency sweep

7.2

start frequency and end frequency

The start frequency and end frequency are the upper and lower frequency limits of the frequency sweep. The signal generator always sweeps from the start frequency to the end frequency and back to the start frequency.

- When the start frequency < the end frequency, the signal generator scans from low frequency to high frequency.
- When start frequency > end frequency, the signal generator scans from high frequency to low frequency.
- When start frequency = end frequency, the signal generator outputs at a fixed frequency.

After enabling sweep mode, click **Start frequency/center frequency** Switch key to switch to the start frequency setting. At this time, press the "Start" key. "Frequency" is highlighted. Note that at this time **end frequency/span** The switch key automatically switches to "End Frequency". Click the corresponding input box, set the start frequency and end frequency through the pop-up virtual numeric keyboard. By default, the start frequency is 100 Hz and the end frequency is 1 kHz. The start and end frequency ranges are related to the instrument model and waveform type, please refer to [Table 5.1: Continuous waveform frequency setting range](#).

After modifying the start frequency or end frequency, the signal generator will start sweeping output from the specified start frequency again.

7.3

Center frequency and frequency span

You can also set the boundaries of the frequency sweep via center frequency and frequency span.

- Center frequency = (start frequency + end frequency)/2
- Frequency span = end frequency - start frequency

After enabling sweep mode, click **Start frequency/center frequency** Switch key to switch to the center frequency setting. Press the "Center Frequency" button. "Rate" is highlighted. At this time **end frequency/span** The toggle key automatically switches to "span". Click the corresponding input box to pop up The virtual numeric keypad sets the center frequency and frequency span. By default the center frequency is 550 Hz and the frequency span is 900 Hz. The center frequency and span value ranges of different waveforms are different, and the center frequency and frequency span influence each other.

The frequency span range is affected by the center frequency, recorded $f_m = (f_{max} - f_{min})/2$, f_{max} and f_{min} Represents the upper and lower limits of the start/end frequency of the currently selected waveform respectively ([Table 5.1: Continuous waveform frequency setting range](#)).

- When the center frequency $\leq f_m$ When , the frequency span range is $\pm 2 * (\text{center frequency} - f_{min})$

- When the center frequency $> F_m$ When , the frequency span range is $\pm 2 * (F_{max} - \text{Center frequency})$

Taking a sine wave as an example, F_{min} is 1 μHz , F_{max} is 200 MHz, F_m Approximately 100 MHz. If the center frequency is 50 MHz, the frequency span can be set in the range of $\pm 2 * (50 \text{ MHz} - 1 \mu\text{Hz})$, which is approximately $\pm 100 \text{ MHz}$; if the center frequency is 120 MHz, the frequency span can be set in the range of $\pm 2 * (200 \text{ MHz} - 120 \text{ MHz})$, approximately $\pm 160 \text{ MHz}$.



hint

To perform a sweep from low frequency to high frequency, set frequency span to positive; to perform a sweep from high frequency to low frequency, set frequency span to negative.

7.4

Sweep time

Sweep time refers to the time required to scan from the start frequency to the end frequency.

Click **Scan time** In the input box of the item, set the sweep time through the pop-up virtual numeric keyboard. The frequency sweep time defaults to 1 s, and the resolution The rate is 1 ms, and the settable range is 1 ms~250,000 s and is related to the frequency sweep type, trigger source, start hold time, return time and end hold time. Note $T_P = \text{Scan time} + \text{Start hold time} + \text{Return time} + \text{End hold time}$:

• Linear sweep:

- Internal trigger source: $T_P + 1 \text{ ms} \leq 8,000 \text{ s}$
- Manual trigger source/external trigger source: $T_P \leq 250,000 \text{ seconds}$

• Logarithmic sweep/step sweep: $T_P \leq 500 \text{ seconds}$

After modifying the sweep time, the signal generator will restart the sweep output from the specified "start frequency".

7.5

start/stop hold

Start hold refers to the time that the output signal remains output at the "start frequency" after the frequency sweep starts. After the initial hold time is over, the signal generator will continue to change the frequency output according to the current sweep type.

Termination hold refers to the time that the output signal continues to maintain the output of the "end frequency" after the signal generator scans from the "start frequency" to the "end frequency".

Click **initial hold** or **terminate hold** In the corresponding input box, set the start/stop hold time through the pop-up virtual numeric keyboard. between. The default start hold and end hold time is 0 s, the resolution is 1 ms, the settable range is from 0 s to 3600 s and is related to the sweep type, trigger source, return time and scan time. Note $T_P = \text{scan time} + \text{initial hold time} + \text{return time} + \text{termination Hold time}$:

• Linear sweep:

- Internal trigger source: $T_P + 1 \text{ ms} \leq 8,000 \text{ s}$
- Manual trigger source/external trigger source: $T_P \leq 250,000 \text{ seconds}$

• Logarithmic sweep/step sweep: $T_P \leq 500 \text{ seconds}$

After modifying the start or end hold time, the signal generator will restart the sweep output from the specified "start frequency".

7.6

time of return

Return time refers to the time for the output signal to return from the "end frequency" to the "start frequency".

Click **time of return** In the input box of the item, set the return time through the pop-up virtual numeric keyboard. The return time defaults to 0 s, minutes

The resolution is 1 ms, and the settable range is from 0 s to 3600 s and is related to the sweep type, trigger source, start hold time, end hold time and scan time. Note $T_P = \text{Scan time} + \text{Start hold time} + \text{Return time} + \text{End hold time}$:

• Linear sweep:

- Internal trigger source: $T_P + 1 \text{ ms} \leq 8,000 \text{ s}$
- Manual trigger source/external trigger source: $T_P \leq 250,000 \text{ seconds}$

• Logarithmic sweep/step sweep: $T_P \leq 500 \text{ seconds}$

After modifying the return time, the signal generator will start sweeping output from the specified "start frequency" again.


7.7

Sweep trigger source

The trigger source of frequency sweep can be internal trigger, external rising edge, external falling edge or manual trigger. When the signal generator receives a trigger signal, it generates a scan output and then waits for the next trigger. Click the drop-down menu of **trigger** and select the trigger source. The default is internal trigger.

- **Internal trigger:** The signal generator outputs a continuous swept waveform. The trigger period is determined by the specified sweep time, return time, start hold and end hold time.
- **External rising edge:** The signal generator receives the signal from the corresponding channel on the rear panel. **[AUX IN/OUT]** The trigger signal input by the connector starts a frequency sweep every time a TTL pulse with a rising edge is received.
- **External falling edge:** The signal generator receives the signal from the corresponding channel on the rear panel. **[AUX IN/OUT]** The trigger signal input by the connector starts a frequency sweep every time a TTL pulse with a falling edge is received.
- **Manual trigger:** When selecting manual trigger, click the manual trigger button in the corresponding channel configuration area.



trigger button , immediately start a frequency sweep output.

hint

When the trigger source is set to "Internal trigger" or "Manual trigger", the signal generator can **[AUX IN/OUT]** The connector outputs a TTL compatible signal with specified edges. See *Trigger output settings*.

7.8

Marking frequency

The synchronization signal of the frequency sweep signal always outputs a high level at the beginning of each sweep. If you disable the Mark Signal feature, the sync signal will go low at the end of the scan. If you enable the Marker Signal feature, the sync signal will go low when the output frequency reaches the specified marker frequency.

After enabling the frequency sweep function, click the channel tab below the frequency sweep setting interface to enter the channel setting **mark signal** interface. Click the item switch to turn the marking feature on or off. When marking is turned on, you can click **Marking frequency** Item input box settings Mark frequency value. The settable range of the marker frequency is limited by the "start frequency" and "end frequency" of the frequency sweep.



illustrate

For step scan (the sweep points determined by the start frequency, end frequency and step number are $f_1, f_2, \dots, f_n, f_{n+1}, \dots$), if the set mark frequency is the value of the sweep point, At the beginning of the scan, the sync signal is TTL high and changes to low at the marker frequency. If the set mark frequency is not equal to the value of the sweep point, the synchronization signal will select the sweep point closest to the frequency and become low level. For example, if the mark frequency is set to 1 MHz, the sweep points are only 0.99 MHz and 1.01. MHz, then the software will internally select 0.99 MHz as the mark frequency and apply it to the digital system.

8 burst

DG900 Pro can output a waveform with a specified number of cycles, called a burst signal. You can generate burst signals using sine waves, square waves, sawtooth waves, arbitrary waves (except DC), noise (only available for "Gated" burst type).

Click the "Output Mode" drop-down menu on the user interface and select "Burst" to enter the burst setting interface, as shown in the figure below. You can click the corresponding tab at the bottom of the interface to enter the continuous wave setting interface, burst setting interface or channel setting interface. Please refer to the continuous wave setting and channel setting respectively, [continuous wave](#) and [Channel settings](#); this section only introduces burst settings.



hint

When the fundamental wave frequency is less than or equal to 125 μHz, the burst is not allowed to be turned on.



Figure 8.1 Burst setting interface

8.1 Burst type

DG900 Pro can output two types of burst signals: N cycle and gated. The default type is N cycle. In the burst setting interface ([Figure 8.1](#)) Click the "Burst Type" drop-down menu to select "N-Cycle" or "Gated." Different burst types have different trigger sources and settable waveform parameters, see the table below.

Burst type		trigger source	Burst parameters
N cycle burst	customize	Internal/external/manual trigger	Delay, burst period, source, trigger output (can be set only for manual trigger and internal trigger), phase, cycle number, idle level
	unlimited	External/manual trigger	Delay, source, trigger output (can only be set when triggering manually setting), phase, idle level
gated burst		external trigger	Start phase, gate polarity, idle level

N cycle burst

In N-cycle burst mode, when the instrument receives a trigger signal, it outputs a waveform with a specified number of cycles or infinite cycles. The waveform functions that support N cycle burst signals include sine wave, square wave, sawtooth wave and arbitrary wave (except DC). Click **Number of cycles** **Down**

Pull down the menu and set the number of burst cycles to unlimited or customized:

- **Unlimited:**Infinite burst is equivalent to setting the number of waveform cycles to infinite. When the signal generator receives the trigger signal, it outputs a continuous waveform.

- **customize:**After selecting customization, you can click **Number of cycles** in the input box of the item, set the cycle through the pop-up virtual numeric keyboard. Number of rings. The number of cycles can be set in the range of 1~1 M, and the default is 1. When changing the number of pulse train cycles, the instrument will automatically increase the pulse train period to adapt to the specified number of pulse train cycles (but will not change the waveform frequency).

gated burst

In gated burst mode, the signal generator operates according to the corresponding channel on the rear panel. **[AUX IN/OUT]** The external signal level input on the connector controls the waveform output. The waveform functions that support gate mode include sine wave, square wave, sawtooth wave, noise and arbitrary wave (except DC). The signal generator outputs a continuous waveform when the gate signal is "true". When the gate signal is "false", it stops the current waveform output, and then the output remains at the voltage level corresponding to the starting phase of the selected waveform (i.e. idle level) on.

8.2

burst delay

The burst delay is only applicable to the N-cycle burst mode. The delay refers to the time between the instrument receiving the trigger signal and starting to output the burst signal.

Click **delay** in the input box of the item, set the delay time through the pop-up virtual numeric keyboard. The default burst delay value is 0 s, and the resolution Rate 0.1 ns. The settable range of burst delay is related to the trigger source:

- Manual trigger source/external trigger source: 0 s to 20 s.
- Internal trigger source: 0 s to $(T_{burst} - T_{wave} \times N_{cycle} \div 6.4 \text{ ns}) \times 6.4 \text{ ns} - 4 \mu\text{s}$ [1], and not greater than 20 s.
 - T_{burst} :burst period
 - T_{wave} : Waveform period (that is, the period of the basic waveform (sine wave, square wave, etc.))
 - N_{cycle} :Number of loops



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[1]:[x] means rounding x up

8.3

burst phase

In burst mode, the phase parameters of the basic waveform no longer play a role, and the phase characteristics of the signal are determined by the burst phase. When the "N Cycle" burst type is selected, set the burst phase **phase** burst setting interface; when the "Gated" burst type is selected, set the burst phase in the burst setting interface. **starting phase** Item sets the burst phase. The phase can be set in the range of -360°~360°, and the default is 0°.

Resolution 0.01°.

- For sine, square, sawtooth, and pulse waves, 0° is the point where the waveform passes 0 V (or the DC offset value) in the forward direction.
- For noise, the burst phase setting has no effect.
- For arbitrary waves, 0° is the first waveform point.



hint

In burst mode, the basic waveform phase does not support setting and is fixed at 0°.

8.4

burst period

Burst period is only available for internally triggered N-cycle burst mode (customized number of cycles). The burst period is defined as the time from the start of one burst signal to the start of the next burst signal.

Click **burst period** In the input box of the item, set the cycle through the pop-up virtual numeric keyboard. The settable range is 4 μs~8 ks, the default value is 10 ms, and the resolution is 0.1 ns.

- Burst period $\geq \lceil (\text{Burst cycle number} \times \text{waveform period}) \div 6.4 \text{ ns} \rceil \times 6.4 \text{ ns} + 4 \mu\text{s} \lceil 1 \rceil$.
- If the set burst period is too small, the signal generator will automatically increase the period to allow the specified number of cycle outputs.



illustrate



[1]:[x] means rounding x up

8.5

Burst trigger source

Burst signal supports internal trigger, external rising edge, external falling edge and manual trigger. Click **source** drop-down menu, select Touch Source, the default is internal trigger.

- **Internal trigger:** N-cycle burst mode only for custom number of cycles. When internal trigger is selected, the instrument will output a burst signal with a specified number of cycles. The burst signal generation rate is determined by the set **burst period** Decide. After the specified number of cycles of output, the instrument output stops and waits for the next trigger.

- **External rising edge:** When external rising edge trigger is selected, the instrument receives the signal from the specified channel on the rear panel. **[AUX IN/OUT]** The trigger signal input by the connector starts a burst output every time it receives a TTL pulse with a rising edge.
- **External falling edge:** When external falling edge trigger is selected, the instrument receives the signal from the specified channel on the rear panel. **[AUX IN/OUT]** The trigger signal input by the connector starts a burst output every time a TTL pulse with a falling edge is received.
- **Manual trigger:** Only used in N cycle burst mode. When selecting manual trigger, in [Figure 8.1](#) Click the manual trigger button on the interface  or press the front panel  Start a burst output immediately. If the corresponding channel output is not turned on, trigger will be ignored.

hint

When the trigger source is set to "Internal trigger" or "Manual trigger", the signal generator can **[AUX IN/OUT]** The connector outputs a TTL compatible signal with specified edges. See [Trigger output settings](#).

8.6

Gating polarity

Gating polarity is only available in gated burst mode. The gate polarity is used to specify the output burst signal when the gate signal is high level or low level. The gate signal is output from the corresponding channel on the rear panel. **[AUX IN/OUT]** Connector input.

In the burst setting interface, click the "Burst Type" drop-down menu and select "Gated" to enter the gated burst setting interface. Click

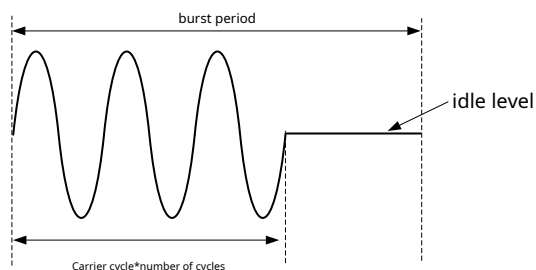
Gating polarity In the drop-down menu of the item, select "Positive Polarity" or "Negative Polarity". The default is positive polarity.

- **Positive polarity:** The signal generator outputs a continuous waveform when the gate signal is high level. When the gate signal is low level, it stops the current waveform output, and then the output will remain at **starting phase** on the voltage level.
- **Negative polarity:** The signal generator outputs a continuous waveform when the gate signal is low level. When the gate signal is high level, it stops the current waveform output, and then the output will remain at **starting phase** on the voltage level.

8.7

idle level

In burst mode, when there is no burst signal output, the output will not be turned off, but will remain at a specified voltage level. This level is called the idle level. For example, in the N cycle burst mode, if the number of burst cycles * carrier cycle < burst cycle, then after the signal source outputs the carrier waveform with the specified number of cycles, it will continue to output the idle level until one burst cycle is met, as shown in the figure below. In the gated burst mode, when the gate signal is "false", the idle level will also be output.



After enabling the burst function, in the burst setting interface ([Figure 8.1](#)), click **idle level** Select the appropriate option from the drop-down menu:

- **First point:**Select the level at the first point of the carrier waveform as the idle level.
- **Top of waveform:**Select the level at the vertex of the carrier waveform as the idle level.
- **Middle of waveform:**Select the level at the midpoint of the carrier waveform as the idle level.
- **Bottom of waveform:**Select the level at the lowest point of the carrier waveform as the idle level.
- **customize:**Select the level at a specified point on the carrier waveform as the idle level. When selecting custom idle level, click the input box of **idle level** the item and enter the required value through the pop-up virtual numeric keyboard. Range is 0 to 65,535, default is 0.



hint

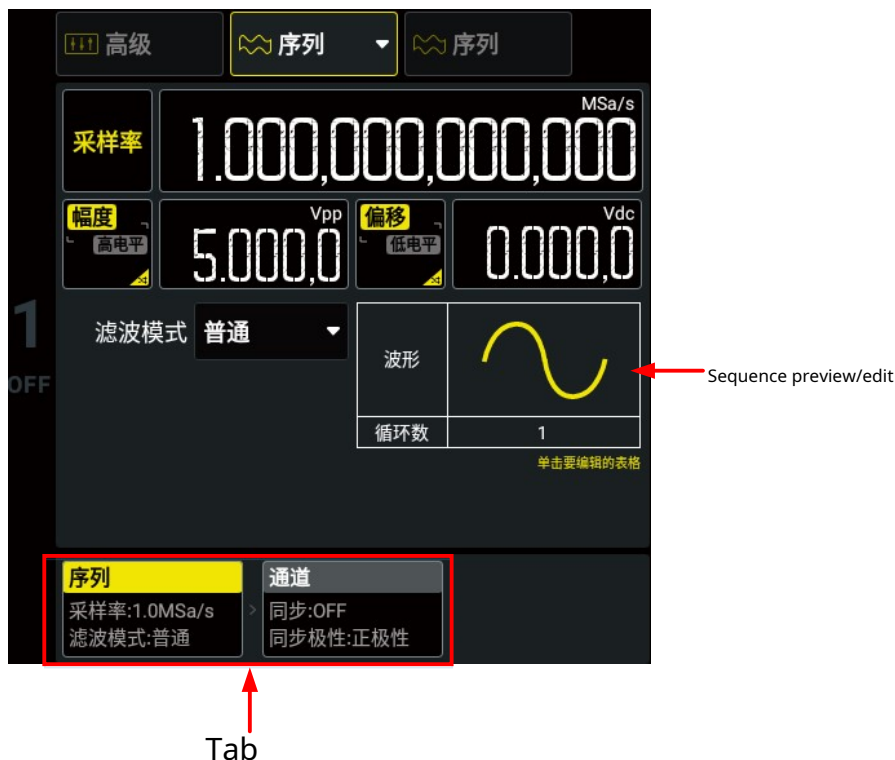
When noise is used as a carrier, the idle level is fixed to the level of the 32768th point of the noise waveform and cannot be set.

9

sequence

A sequence is a combined waveform composed of several waveform segments arranged in sequence. In sequence mode, users can customize sequences and store edited sequences in internal or external memory (*.seq format).

Click the "Output Mode" drop-down menu in the user interface and select "Sequence" to enter the sequence setting interface, as shown in the figure below. You can click the tab at the bottom of the interface to enter the sequence setting interface or channel setting interface. For channel settings, please refer to [Channel settings](#) Chapter, this section only introduces sequence settings.



hint

The sequence mode switch states of CH1 and CH2 are always synchronized.

Figure 9.1 Sequence setting interface

9.1

Edit sequence

in such as [Figure 9.1](#) In the sequence editing interface shown, click the "Sequence Preview/Edit" area to open the sequence editing table, as shown in the figure below.

通道1

序号	1	2	3	4	5	6	7
波形	Sine	Sine	Sine	Sine	Sine	Sine	Sine
循环数	1	0	0	0	0	0	0
长度	16384	16384	16384	16384	16384	16384	16384

加载

清除

保存

应用

Figure 9.2 Sequence editing table

- **Serial number:**Displays the entry number n of the sequence, ranging from 1 to 64. Drag the sequence editing table left or right to view all entries.
- **Waveform:**Displays the waveform type of entry n. Click the cell of this row to set the waveform of the specified entry.
- **Number of cycles:**Displays the number of cycles for entry n. Click the cell of this row to set the number of cycles for the specified entry.
- **length:**Displays the waveform length of entry n. Click a cell in this row to set the length of the specified entry.

After the sequence function is turned on, the sequence editing table contains a sine wave entry that cycles once by default, and other entries have a cycle count of 0. You can edit a sequence as follows.



hint

You can also use:**SOURce1:TRACe:DATA:DAC16**<type>,<flag>,<data>Customized waveforms, usage of commands
Please see the method "DG800 Pro/DG900 Pro Programming Manual".

- 1.Click **waveform** For a row of cells, select the waveform type of the specified entry in the pop-up built-in waveform menu.
- 2.Click **Number of cycle**For a row of cells, set the number of cycles for the specified entry through the pop-up virtual numeric keyboard. The maximum number of cycles can be set. Set to 256. This entry is not output when the cycle number is set to 0.
- 3.Click a cell**length** and set the data length of the specified entry through the pop-up virtual numeric keyboard. The data length can be set in the range of 32 pts~16 Mpts (optional 32 Mpts/CH), and the total number of valid entries in the current sequence (entries with a cycle number other than 0) cannot exceed 16 Mpts (optional 32 Mpts/CH) .
- 4.After finishing editing, click to confirm the modification and set the current channel waveform to this sequence.

If you want to clear the current entry configuration, click **Clear**, the sequence editing table will be restored to its default state.

9.2

Save/Load Sequence

save sequence

After completing sequence editing, the sequence can be saved in internal/external memory.

- 1.in such as [Figure 9.2](#)Click on the interface **save** pop up the storage menu.

2. Enter the internal/external memory target path and click **save**, pop up the virtual keyboard.

3. Enter the sequence name in the pop-up virtual keyboard, and then click the confirmation key of the virtual **Enter**, complete the sequence guarantee keyboard to save. The saved sequence can be seen in the target path.

load sequence

You can load sequence files from internal/external memory.

1. in such as *Figure 9.2*. Click on the interface **load** to pop up the storage menu.

2. Enter the internal/external memory target path and check the sequence file (*.seq) that needs to be loaded.

3. Click and the **load** document will open the file in the sequence editing form and apply it to the current channel.

hint

For general operations of the storage menu, please refer to *Storage management*.



9.3

Set sequence parameters

in such as *Figure 9.1*. You can also make the following settings in the sequence interface shown.

Set sampling rate

Click **Sampling Rate** input box to set the sampling rate of the sequence waveform. The sampling rate can be set in the range of 1 μ Sa/s~312.5 MSa/s, and the default Think 1 MSa/s.

Set amplitude/high level

Please refer to *Output sine wave* Set amplitude/high level. Please note that the sequence does not support setting the amplitude in Vrms and dBm.

Set offset/low level

Please refer to *Output sine wave* Set amplitude offset/low level.

Set filter mode



Click **filter mode** drop-down menu to select the filtering type of the sequence waveform.

- **ordinary**: The frequency response is wide and flat, with fast edge times, but the step response produces large overshoot.
- **Stepping**: The step response is ideal, with narrow bandwidth, long rise/fall time, and slow edge time.
- **Interpolation**: Supports output of user's original waveform signal completely without distortion.

10

frequency meter

The DG900 Pro series provides a frequency meter function that can measure parameters such as frequency, period, duty cycle, positive pulse width, and negative pulse width of external input signals. The frequency meter measures the signal through the front panel[Counter]Connector input. You can open the frequency meter settings menu in the following ways:

- Click the frequency meter label at the bottom of the screen to open the frequency meter setting menu.
- Press the front panel  key to open the frequency meter setting menu.
- Press the frequency meter switch key on the front panel , while opening the frequency meter setting menu, enable the frequency meter.


When the frequency meter setting menu is opened, the original CH2 configuration area is displayed as the frequency meter setting menu, as shown in the figure below. Click on CH2 pass channel label, or press the front panel select key  The frequency meter setup menu can be closed.



Figure 10.1 Frequency meter setting menu

1.Frequency meter switch status indicator bar

2.Measurement drop-down menu

3.Gate time drop down menu

4.Running status drop-down menu

5. Single measurement key

10.1 Enable frequency meter

On/Off

Press the frequency meter switch key on the front panel , to enable the frequency counter function. You also click Frequency Meter in the Frequency Meter settings menu

Switch the status indicator bar to enable the frequency counter function. After the frequency meter function is enabled, the frequency meter switch status indicator bar displays "ON" and the frequency meter label is highlighted.



hint

When frequency timing is enabled, the output of CH2 will be turned off and configuration of CH2 will be disabled.

10.2 Setting up the frequency counter

In the frequency meter setup menu, you can configure the following parameters for the frequency meter.


Measurement parameters

The frequency meter can measure the following parameters: frequency, period, duty cycle, positive pulse width and negative pulse width. The default is frequency. Click the "Measurement Item" drop-down menu in the frequency meter setting menu to set the measurement parameters. The selected measurement parameter will be displayed enlarged, and when the statistics function is turned on, the statistical information of this parameter will be displayed (see [Statistics function](#)).

Operating status

Click the "Run Status" drop-down menu in the frequency meter settings menu and select "Run", "Stop" or "Single".

- **Run:** The input signal is continuously measured in the current configuration.

- **single:** Enter the "Stop" state after performing a measurement. You can also click the single measurement button  Perform a single measurement (in any operating state).

- **stop:** Stop the measurement after completing the measurement in progress.

gate time

Click the "Gate Time" drop-down menu in the frequency meter setting menu and select the gate time of the measurement system as automatic, 1 ms, 10 ms, 100 ms, 1 s, 10 s, 100 s, 1000 s or 10,000 s. The default is automatic. .

input resistance

Click in the frequency meter settings menu **input resistance** , select the input impedance as "50Ω" or "1MΩ" in the drop-down menu, the default Consider 1 MΩ.

high frequency suppression

When the input impedance of the frequency counter is set to 1 MΩ, the high frequency suppression function can be turned on. When measuring low-frequency signals, high-frequency suppression can be used to filter out high-frequency components (>60 kHz) to improve measurement accuracy.

Click in the frequency meter settings menu **high frequency suppression** to turn on or off the high frequency suppression function.

Coupling type

Click in the frequency meter settings menu **Coupling type** , select the coupling mode as "DC" or "AC" in the drop-down menu. Please note Note that when the input impedance is 50 Ω , the coupling mode is fixed at "DC" coupling.

- **DC**:DC coupling, both AC and DC components contained in the signal being measured can pass through.
- **AC**:AC coupling, the DC component of the measured signal is filtered out.

Frequency Range

Click in the frequency meter settings menu **Frequency Range** , select the frequency range of the measurement signal in the drop-down menu.

- When the input impedance is 50 Ω , the frequency range can be selected from 0 Hz to 250 MHz, 250 MHz to 500 MHz, and 500 MHz to 1 GHz.
- When the input impedance is 1 M Ω , the frequency range is fixed at 0 Hz~250 MHz.

Statistics function

See [Statistics function](#).

10.3 Statistical functions

The statistical function can automatically calculate the maximum value, minimum value, average value and standard deviation of the current measurement parameters, and can display changes in measurement values in numbers and dynamic curves. In the frequency meter setting interface **Statistics** (0.7) Click the item switch to turn on or off the statistical function. After turning on the statistics function, you can click the statistics tab below the frequency meter setting menu to enter the statistics interface, as shown in the figure below.



Figure 10.2 Frequency meter statistics interface

Click **Clear** key to clear the current statistical results, and the number of statistics will restart from 1.



hint

The frequency meter supports statistics of a maximum of 256 measurement results. When the number of measurements exceeds 256, the measurement data will be cleared and statistics will be restarted from 1.

11

Channel copy

DG900 Pro supports the channel copy function, which copies the status information of one channel to another channel. See the table below for information that can be copied.

Click below the user interface **Channel copy** key to open the channel copy menu. Users can copy channels through this menu:

- Click **CH1 > CH2** Copy the status and waveform information of channel 1 to channel 2.
- Click **CH2 > CH1** Copy channel 2 status and waveform information to channel 1.
- Click **exchange** , exchange the status of channel 1 and channel 2.

hint

When channel coupling or channel tracking is turned on, the channel copy function is disabled.

Table 11.1 Dual channel operating parameters

√ means supported, × means not supported, * means supported under certain conditions.

parameter	track	copy
basic function		
Channel output status	×	×
Output mode	√	√
Basic waveform	√	√
frequency	√	√
frequency coupling	force close	force close
cycle	√	√
Amplitude	√	√
Amplitude coupling	force close	force close
offset	√	√
Phase	√	√
phase coupling	force close	force close
square wave duty cycle	√	√
sawtooth wave symmetry	√	√
pulse width	√	√
rising edge	√	√
falling edge	√	√
Arbitrary wave type	√	√
Harmonic type	√	√
Harmonic order	√	√
Harmonic combination	√	√
Sequence harmonic amplitude	√	√
Sequential harmonic phase	√	√

parameter	track	copy
Mixed harmonic amplitude list	√	√
Mixed harmonic phase list	√	√
burst		
state	√	√
model	√	√
(trigger) source	√	√
burst delay	√	√
Number of cycles	√	√
cycle	√	√
Phase	√	√
Gating polarity	√	√
idle level	√	√
Sweep		
state	√	√
model	√	√
trigger source	√	√
start frequency	√	√
end frequency	√	√
Center frequency	√	√
frequency span	√	√
initial hold	√	√
terminate hold	√	√
Scan time	√	√
time of return	√	√
Mark signal switch	√	√
Mark frequency value	√	√
modulation		
Modulation type	√	√
modulation source	√	√
modulation waveform	√	√
modulation frequency	√	√
modulation depth	√	√
carrier suppression	√	√
Frequency offset	√	√
phase deviation	√	√
Duty cycle deviation	√	√
width deviation	√	√
modulation polarity	√	√
modulation rate	√	√
modulation amplitude	√	√
frequency hopping	√	√

parameter	track	copy
Phase	√	√
Overlay waveform ^[1]	*	*
Superposition frequency	√	√
Overlay ratio	√	√
Channel properties		
Synchronous switch	√	√
sync port	√	√
Sync polarity	√	√
reverse phase	√	√
impedance	√	√
trigger output	√	√



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[1]: When the superimposed waveform is a channel, tracking and copying are not supported.

12

Channel settings

In the user interface (such as [Figure 4.6](#)(shown in the figure below) Click the channel tab to enter the channel setting interface of the corresponding channel, as shown in the figure below.



Figure 12.1 Channel setting interface

12.1 Synchronization signal settings

This series of instruments can output synchronization signals of continuous waveforms (except noise, DC, and harmonics), swept waveforms, burst waveforms, and modulated waveforms. The synchronization signals of the two channels can be obtained from the corresponding channels on the rear panel of the instrument:[AUX IN/OUT]or front panel [CH1]/[CH2]connector output. Users can set the switch and output polarity of the two channel synchronization signals respectively.

Synchronous switch

Click **Synchronize** item switch, enables or disables sync signal output. When sync signal output is enabled, when channel output is turned on, specify

The synchronization port outputs the synchronization signal of the channel; when the synchronization signal output is disabled, the specified synchronization port outputs a logic low level. For

details on synchronization signals, see [Table 12.1: Synchronization signals for each output mode \(synchronization polarity: positive polarity\)](#).

sync port

Currently only back ports are supported. When the output of the synchronization signal is turned on, the synchronization signal is output from the corresponding channel on the rear panel:[AUX IN/ OUT]connector output.

hint

When a channel selects an external trigger source, external modulation, or turns on the trigger output, the rear port synchronization output of the corresponding channel is disabled.



Sync polarity

Set the output polarity of the synchronization signal to trigger external devices that may require rising or falling edge triggering. Click

synchronous pole

sex select "Positive Polarity" or "Negative Polarity" from the drop-down menu.

• **Positive polarity:** Output normal sync signal.

• **Negative polarity:** Outputs the inverted synchronization signal.

Marking frequency

When the output mode is frequency sweep, the "mark signal" function can be enabled. After the marker signal function is enabled, the sync signal will turn to low level when the sweep output frequency reaches the specified marker frequency. For a detailed introduction to marking frequency, please see [Marking frequency](#).

Table 12.1 Synchronization signals of each output mode (synchronization polarity: positive polarity)

Output mode	illustrate
continuous wave mode	<p>In continuous wave mode (except noise, DC, and harmonics), the synchronization signal is a square wave with a duty cycle of 50%. The synchronization signal frequency is related to the waveform output frequency:</p> <ul style="list-style-type: none"> Waveform output frequency ≤ 30 MHz: The synchronization signal frequency is the frequency of the basic waveform. Waveform output frequency ≤ 60 MHz: frequency division output, synchronization signal frequency = waveform frequency/2. Waveform output frequency ≤ 120 MHz: frequency division output, synchronization signal frequency = waveform frequency/4. Waveform output frequency ≤ 200 MHz: frequency division output, synchronization signal frequency = waveform frequency/8. <p>Please note that there is no sync signal output for noise.</p>
modulation mode	<p>In modulation mode, the synchronization signal is a square wave with a duty cycle of 50%. In the first half cycle of the modulation waveform, the synchronization signal is TTL high level.</p> <ul style="list-style-type: none"> For AM, FM, PM, and PWM, the frequency of the synchronization signal is the modulation frequency. For ASK, FSK, and PSK, the frequency of the synchronization signal is the modulation rate. For SUM, the frequency of the synchronization signal is the superposition frequency. <p>hint</p> <p>When externally modulated, the rear port of the corresponding channel (AUX IN/OUT) is used to input external modulation signals and has no sync signal output.</p>
Sweep mode	<ul style="list-style-type: none"> "Mark signal" off: At the beginning of the scan, the sync signal is TTL high and changes to low at the end of the total scan time. "Mark signal" on: For linear and logarithmic sweeps, the sync signal is TTL high at the beginning of the sweep and changes to low at the mark frequency. For step scanning (the frequency sweep points determined by the start frequency, end frequency and step number are $f_1, f_2, \dots, f_n, f_{n+1} \dots$), if the set mark frequency is the value of the sweep point, at the beginning of the scan, the synchronization signal is TTL high level and changes to low level at the mark frequency. If the set marker frequency is not equal to the value of the sweep point, the synchronization signal will select the sweep point closest to the frequency and become low level.

Output mode	illustrate
	<p>hint</p> <ul style="list-style-type: none"> When the trigger source is an external trigger, use the rear port of the channel (AUX IN/OUT) is used to input external trigger signals and has no synchronization signal output. When the trigger output is turned on, the rear port of the corresponding channel (AUX IN/OUT) is used for output trigger signal, no synchronization signal output.
burst mode	<ul style="list-style-type: none"> Infinitely looping N cycle burst:The sync signal is output at high level. N-cycle burst with specified number of cycles:At the beginning of the burst output, the synchronization signal is TTL high level. After the specified number of cycle output is completed, the synchronization signal becomes TTL low level. The frequency of the synchronization signal is the reciprocal of the burst period, and the duty cycle is the carrier period * number of cycles / burst period. Gated burst:At the beginning of the burst output, the synchronization signal is TTL high level. After one output is completed, the synchronization signal changes to TTL low level. In this burst mode, the rear panel AUX IN/OUT The port user inputs the gate control signal, and no synchronization signal is output. <p>hint</p> <ul style="list-style-type: none"> When the trigger source is "external trigger", the rear port of the channel (AUX IN/OUT) is used to input external trigger signals and has no synchronization signal output. When the trigger output is turned on, the rear port of the corresponding channel (AUX IN/OUT) is used for output trigger signal, no synchronization signal output.

12.2 Trigger output setting

In burst mode or sweep mode, when the trigger source is set to "internal trigger" or "manual trigger", the signal generator can **AUX IN/OUT** The connector outputs a TTL compatible signal with specified edges.



illustrate

- When triggered internally, when the signal generator starts a burst or frequency sweep, the signal of the corresponding channel on the rear panel is **AUX IN/OUT** The connector outputs a square wave with a 50% duty cycle.
- When triggered manually, the signal generator starts from the corresponding channel when the burst signal starts. **AUX IN/OUT** The connector outputs a pulse with a pulse width greater than 4 μ s.
- When triggered externally, the corresponding channel **AUX IN/OUT** The connector is used as an external trigger signal input terminal and does not support trigger output.

Click **trigger output** The drop-down menu of the item specifies the edge of the trigger output signal. The default is "off".

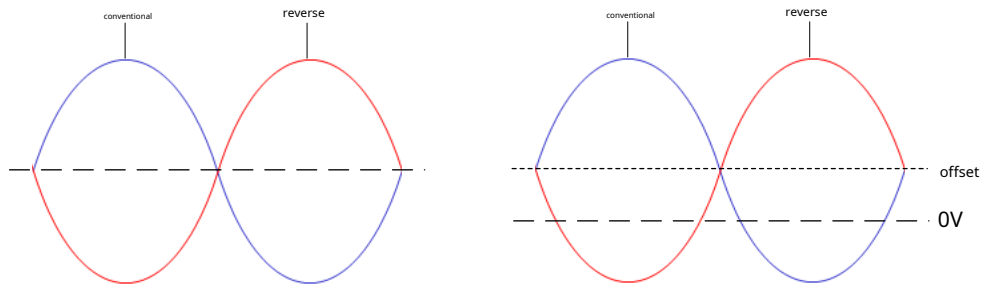
- Off: Disable trigger output signal.
- Rising edge: Select to output the trigger signal on the rising edge.
- Falling edge: Select to output the trigger signal on the falling edge.

12.3 Channel output settings

Set output polarity

Set the output signal to regular output or inverted output. Click Invert (Correlation) on the output **reverse phase** switch, select Normal (On) or settings interface. The default is regular output.

Waveform inversion is inversion relative to the offset voltage. As shown below, the waveform is inverted relative to the offset voltage.



hint

- When setting the waveform inversion, the sync signal associated with the waveform is not inverted. If you need to set the synchronization signal inversion, please refer to [Sync polarity](#), set the synchronization signal polarity to "negative polarity".
- When the waveform is inverted, the offset voltage remains unchanged.

Set up channel tracking

When the channel tracking function of a specified channel is turned on, various parameters and status of the channel can be changed (see [Table 11.1: Dual channel operating parameters](#)) to another channel. In scenarios where two channels require the same configuration, the channel tracking function simplifies the operation steps. Click **track** drop-down menu and choose to turn channel tracking on, invert, or off.

- **Open:** Turn on tracking. For example, when the channel tracking function of CH1 is turned on, the instrument automatically copies the various parameters and status of CH1 (except the channel output switch status) to CH2. When the parameters and status of CH1 are modified, the configuration will also take effect on CH2. At this time, the two channels can output the same signal (channels are turned on).
- **Inversion:** Tracking is on, but the output polarity of the destination channel is opposite to the source channel.
- **closure:** Turn off tracking. Default state.

hint

- Coupled mode (see [Coupling settings](#)) is turned on, turning on channel tracking will automatically turn off channel coupling.
- If waveform superposition is enabled on a channel and the superposition source is another channel, the tracking function is disabled.
- When the sequence mode, frequency counter or front terminal synchronization output function is turned on, the tracking function is disabled.

Set impedance

The setting of the output impedance affects the output amplitude and DC offset. This instrument has a fixed series output impedance of 50 Ω for each front panel output connector. If the actual load differs from the specified value, the displayed voltage level will not match the voltage level of the component under test. To ensure correct voltage levels, the load impedance setting must match the actual load.


Click the **impedance** drop-down menu and select the impedance as "High Impedance" or "Load". When selecting "Load", you can **impedance** Item loss customize the impedance value in the box, and the settable range is 1 Ω ~10 k Ω .

**illustrate**

- After modifying the impedance settings, the signal generator will automatically adjust the output amplitude and offset voltage. For example, if the current amplitude is set to "5 Vpp" and the output impedance is changed from "50 Ω " to "High Impedance", the amplitude displayed in the amplitude input box will be doubled to "10 Vpp". On the other hand, if you change the output impedance from "High Impedance" to "50 Ω ", the amplitude drops by half to 2.5 Vpp. Note that only the display changes after the parameters are modified, and the actual output of the signal generator does not change.
- If the impedance is set to "High Impedance", the amplitude unit cannot be set to "dBm".

13

Coupling settings

DG900 Pro supports frequency, amplitude and phase coupling. Click  > **coupling**, open the coupling settings menu.

In the coupling settings menu, **coupling benchmark** The item displays the coupled reference channel. The reference channel is the currently selected channel. You can Switch the reference channel by selecting a different channel. After coupling is turned on, when the frequency, amplitude or phase of any channel is changed, the frequency, amplitude or phase of the other channel will be automatically adjusted according to the set difference or ratio. You can set up the coupling as described below.



Figure 13.1 Coupling setting menu

The coupling function is only available when both channel output modes are continuous wave mode. The corresponding relationship between the coupling function and the basic waveform is as follows.

√ means support, × means not support

coupling function	sine wave	square wave	sawtooth wave	pulse	noise	arbitrary wave (non-DC)	DC	harmonic
frequency coupling	√	√	√	×	×	×	×	×
Amplitude coupling	√	√	√	×	√	√	×	×
phase coupling	√	√	√	×	×	×	×	×

frequency coupling

Frequency coupling allows you to couple frequencies between channels by a constant difference or ratio.

- 1.Click **frequency coupling** Item switch, select to turn frequency coupling on or off. Default is off.
- 2.Click **frequency coupling** Select "Difference" or "Proportional" coupling from the item drop-down menu, and then click the input box on the right to set the difference or proportion.
 - Frequency difference: the frequency difference between the CH1 and CH2 channels. Record the frequency of the reference channel as F_{basic} , the set frequency difference is F_{dev} , then the frequency of the other channel $F=F_{basic}+F_{dev}$.
 - Frequency ratio: the ratio of the frequencies of CH1 and CH2 dual channels. Record the frequency of the reference channel as F_{basic} , set the frequency ratio to F_{ratio} , then the frequency of the other channel $F=F_{basic}*F_{ratio}$. The frequency ratio range is 0.001~1000.

phase coupling

Using phase coupling, the phases between channels can be coupled according to a constant difference or ratio.

1.Click **phase coupling** Item switch, select to turn on or off phase coupling. Default is off.

2.Click **phase coupling** Select "Difference" or "Proportional" coupling from the item drop-down menu, and then click the input box on the right to set the difference or Proportion.

- Phase difference: the phase difference between the CH1 and CH2 channels. Let the phase of the reference channel be P_{basic} , the set phase difference value is P_{dev} , then the phase of the other channel $P = P_{basic} + P_{dev}$.
- Phase ratio: the phase ratio between CH1 and CH2 dual channels. Let the phase of the reference channel be P_{basic} , the phase ratio is set to P_{ratio} , then the phase of the other channel $P = P_{basic} * P_{ratio}$. The phase ratio ranges from 0.01 to 100.

Amplitude coupling

Using amplitude coupling, the amplitudes between channels can be coupled by a constant difference or ratio.

1.Click **Amplitude coupling** Item switch, select to turn amplitude coupling on or off. Default is off.

2.Click **Amplitude coupling** Select "Difference" or "Proportional" coupling from the item drop-down menu, and then click the input box on the right to set the difference or Proportion.

- Amplitude difference: the amplitude difference between the CH1 and CH2 channels. Record the amplitude of the reference channel as A_{basic} , the set amplitude difference is A_{dev} , then the amplitude of the other channel $A = A_{basic} + A_{dev}$.
- Amplitude ratio: the amplitude ratio between CH1 and CH2 dual channels. Record the amplitude of the reference channel as A_{basic} , set the amplitude ratio to A_{ratio} , then the amplitude of the other channel $A = A_{basic} * A_{ratio}$. The frequency ratio range is 0.001~1000.

**hint**

- When the coupling mode is "Proportional", if the frequency, amplitude or phase of any channel exceeds the upper/lower limit calculated according to the coupling rules due to modifying the coupling ratio, switching waveforms or changing waveform parameters, the signal generator will automatically adjust the reference channel waveform parameters to avoid parameter overruns.
- When the coupling mode is "Difference", if the frequency, amplitude or phase of any channel exceeds the upper/lower limit after being calculated according to the coupling rules due to modification of the coupling difference, the signal generator will automatically adjust the coupling difference to avoid parameter overruns. limit; if the parameters exceed the limit due to switching waveforms or changing waveform parameters, close the corresponding coupling switch.
- The coupling function is disabled when channel tracking or frequency meter is on.

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In phase

DG900 Pro provides in-phase functionality. When the output mode is continuous wave mode (except noise and DC), sweep mode (internal trigger source) or burst mode (internal trigger source), click below the main interface **In phase**. After pressing the key, the instrument will reconfigure the two channel to output according to the set frequency and phase.

For two signals with the same frequency or a multiple of frequency relationship, this operation can align their phases. Assume that CH1 outputs a sine wave of 1 kHz, 5 Vpp, and 0° , and CH2 outputs a sine wave of 1 kHz, 5 Vpp, and 180° . Use an oscilloscope to collect the waveforms of the two channels and display them stably. You can find that the phase difference between the two waveforms displayed on the oscilloscope is no longer 180° . At this point, click

In phase key, the waveform in the oscilloscope will be displayed with a 180° phase difference without the need to manually adjust the initial phase in the signal generator.

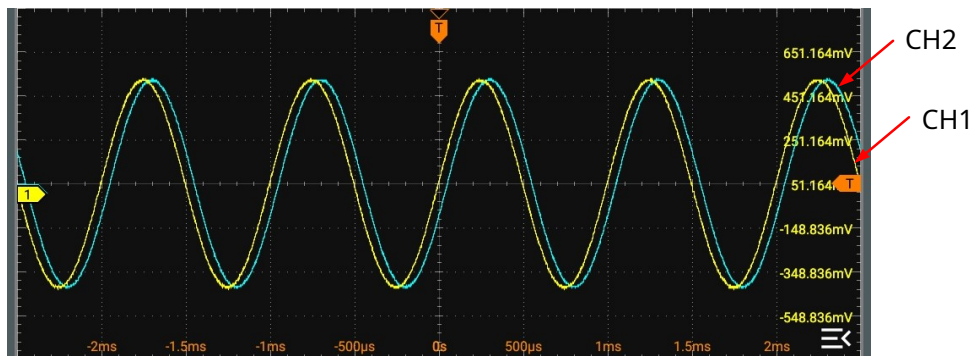


Figure 14.1 Before in-phase



Figure 14.2 After the same phase


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Storage management

Users can store screenshots or custom sequence waveforms to internal or external memory. The front panel of this series of instruments provides a USB HOST interface, which can be used to connect a U disk for external storage. The local directory is "Local Disk (C)" and the external storage is displayed as "USB Disk (D)".

There are several ways to enter the storage menu:

- Click below the main interface **storage** Function key to enter the storage menu.

- Press the front panel  key to enter the storage menu.

15.1 Select file

Before operating on a file or folder, you need to select the object.

1. Select disk

By default, the storage menu interface selects to display the storage content of the internal storage "Local Disk (C)". Select the external storage through the drop-down menu on the upper left side of the storage menu. For example, after selecting "USB Disk(D)", the menu will switch to display the storage content in the D disk of the external memory.




hint

Before using external storage, please ensure that the USB flash drive (FAT32, NTFS or exFAT format) is properly connected.

2. Enter the target directory

Click on the folder to enter the target directory.


3. Select a file or folder

Click the selection box on the right side of the file or folder. After the check is completed, it will be displayed as selected and you  click the selection box again, can uncheck it, and the selection box will return to its original state.



hint

Users can also select all files and folders in the current directory by clicking the Select All icon in the upper right corner of the menu. Click again to select all images

 mark , to cancel the select all operation.

15.2 Create a new folder

The storage menu supports users to create new folders. Click the folder name below the **storage menu** input text through the pop-up virtual keyboard. the device will create a new folder under the current path with that file name.

15.3 Copy and cut

Cut files to specified directory

Select the specified file and click **cut** button, then enter the target directory and click **Paste** , complete the operation.

Copy files to specified directory

Select the specified file and click **copy** button, then enter the target directory and click **Paste** button to complete the operation.

15.4 Renaming

Select the specified file and click **Rename** button, and then enter the file name in the pop-up virtual keyboard to complete the operation.



hint

DG900 Pro can only recognize files whose file names are Chinese or English characters (including numbers and underscores). If you use other characters to name files or folders, they may not display properly in the Storage menu.

15.5 Delete


In the current directory, check the files or folders (empty folders) you want to delete so that they become selected. Click the button below the **delete** menu to complete the deletion.

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upgrade

You can upgrade in the following ways.

1. Make sure the USB flash drive storing the upgrade file is correctly connected to the instrument;



2. Click below the main interface **storage** or front panel  Press the key to enter the storage menu.

3. refer to *Storage management* Select the upgrade file in a section and click under the storage menu to **renew**, click in the pop-up prompt menu **confirm** perform a local upgrade.

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System function settings

In the auxiliary menu, users can set interface and system-related functional parameters. The following methods are available to enter the auxiliary menu:

- Click the notification area in the lower right corner of the interface to enter the auxiliary menu.
- Press the front panel  Press the key to enter the auxiliary menu.
- Click on the lower left corner of the interface  > **Auxiliary**, enter the auxiliary menu.

17.1 Interface settings

exist **Auxiliary** Click in the menu **Interface settings**, enter the interface setting menu to configure the following items.

network status

The device will give different prompts based on the current network connection status:

- Network Config Succeeded! (Network configuration successful!)
- Acquiring IP... (Getting IP...)
- IP Conflict! (IP conflict!)
- DISCONNECTED (no connection!)
- DHCP Config Failed (DHCP configuration failed)
- Read Status Fail! (Status read failed!)
- CONNECTED (Connection successful!)
- Invalid IP (invalid IP)
- IP lose
- Please wait... (Please wait...)

IP configuration method

IP configuration methods include dynamic IP, automatic IP and static IP. Under different IP configuration methods, network parameters such as IP addresses are configured in different ways.

• Dynamic IP

Check "Dynamic IP" to configure the dynamic IP mode. The dynamic IP server in the current network will allocate network parameters such as IP address, subnet mask, gateway address, and DNS server (domain name server) address to the instrument.

• Auto IP

Check "Auto IP" to configure the automatic IP mode. The device automatically obtains the IP address from 169.254.0.1 to 169.254.255.254 and the subnet mask 255.255.0.0 according to the current network configuration. "Auto IP" only works when "Dynamic IP" is not selected or the connection fails.

• Static IP

Check "Static IP" to configure static IP mode. In this case, dynamic IP and automatic IP need to be turned off manually. At this time, you will need to manually configure the "Set IP Address", "Set Subnet Mask", "Set Gateway Address" and "Set DNS Address" items. At this time, users can customize network parameters such as the device's IP address.

- Set IP address

The format of the IP address is nnn.nnn.nnn.nnn. The first nnn can be set in the range of 0 to 255 (except 127), and the valid range is from 0 to 223. The other three nnns are in the range of 0 to 255. It is recommended to ask your network administrator for an available IP address.

This setting will be saved in non-volatile memory. If "Power-on Settings" is set to "Last Value", the next time you power on, both dynamic IP and automatic IP will be turned off, and the device will automatically load the set IP address.

- Set subnet mask

The format of the subnet mask is nnn.nnn.nnn.nnn, where nnn ranges from 0 to 255. It is recommended to consult your network administrator for an available subnet mask.

This setting is saved in non-volatile memory. If the "Power-on Settings" is set to "Last Value", the next time the instrument is powered on, both dynamic IP and automatic IP will be turned off, and the instrument will automatically load the set subnet mask. .

- Set default gateway

In static IP mode, users can set the gateway. The format of the gateway is nnn.nnn.nnn.nnn. The first nnn ranges from 0 to 223 (except 127), and the other three nnn range from 0 to 255. It is recommended to consult your network administrator for an available gateway address.

This setting is saved in non-volatile memory. If "Power-on Settings" is set to "Last Value", the next time you power on, both dynamic IP and automatic IP will be turned off, and the instrument will automatically load the set gateway address.

- Set DNS (Domain Name Server) address

In static IP mode, you can set the domain name server address. The address format of the domain name server is nnn.nnn.nnn.nnn. The first nnn ranges from 0 to 223 (except 127), and the other three nnn range from 0 to 255. It is recommended to ask your network administrator for an available address.

Generally speaking, users do not need to set the domain name server address in the network, so this parameter setting can be ignored.



hint

- When all three IP configuration types are turned on, the priority of parameter configuration from high to low is "Dynamic IP", "Auto IP", and "Static IP".
- The three IP configuration types cannot be turned off at the same time.

MAC address

Displays the instrument's MAC address. The MAC address is always unique to an instrument. When assigning an IP address to an instrument, the instrument is always identified by its MAC address.

VISA address

Displays the VISA address currently used by the instrument.

Apply network parameter settings

Click **application** the currently configured network parameters will take effect.

17.2 Network Authentication

exist **Auxiliary** Click in the menu **Network authentication** enter the network authentication menu to configure the following items.

mDNS

Multicast Domain Name System (mDNS) can be enabled or disabled through the function key of the mDNS item. This system provides the functionality of a DNS server for service discovery in small networks that do not have a DNS server.

CPU name

Click **CPU name** In the input box, set the host name. The host name supports inputting a string with a maximum length of 28 bytes. when When mDNS is turned on, enter "hostname.local" in the browser address bar to access WebControl.

Service Name

After enabling the mDNS function, click **Service Name** Configure service name.

17.3 Basic settings

exist **Auxiliary** Click in the menu **basic settings** , enter the basic settings menu.

language

This product supports Chinese and English help information, prompt information and interface display. **language** item drop-down menu, select the specified through system language.

Boot settings

Users can select the system configuration that will be called when the device is powered on again after a power outage **Boot settings** Item drop-down menu as needed. Click Set as "Default" or "Last value" to default to the last value.

- **Last value:** Restore the settings from the last time the system was powered off.
- **default value:** Restore the system to factory settings.

Power settings

Click **Power settings** Use the drop-down menu to select automatic or manual startup mode after the instrument is powered on.

- **Manual:** After the instrument is powered on, press the power button to turn it on.
- **automatic:** The instrument starts up directly after being powered on.

This setting is saved in non-volatile memory and is not affected by a "factory reset".

Clock source settings

This series of signal generators provides an internal 10 MHz clock source and also receives input from the rear panel. **[10 MHz In/Out]** The input external clock source can also be obtained from **[10MHz In/Out]** The connector outputs a clock source for use by other devices. Click **clock source** drop down

Select the clock source of the instrument as "internal source" or "external source" in the menu. "Internal source" is selected by default.

If "External Source" is selected, the system will detect the rear panel **[10MHz In/Out]** Whether the connector has a valid external clock signal input. If no valid clock source is detected, a prompt message "The system has not detected a valid external clock!" will pop up, and the clock source will be switched to "internal source".

hint

You can synchronize two instruments or multiple instruments by setting the clock source. When two instruments are synchronized, the "in phase" function cannot be used. The "same phase" function is only applicable to adjusting the phase relationship between two output channels of the same instrument, and cannot change the phase relationship of the output channels between two instruments. Of course, you can change the phase relationship between the two instruments by changing the "start phase" of each output channel.

- **Synchronization of two instruments:**

Set the instrument A (clock source to "internal source") **[10MHz In/Out]** Connected to Instrument B (clock source is "External Source") **[10MHz In/Out]**, and then set the two instruments to the same output frequency to achieve synchronization of the two instruments.

- **Synchronization of multiple instruments:**

Divide the 10 MHz clock source of one instrument (the clock source is "internal source") into multiple channels, and then connect them to the clock sources of multiple instruments (the clock source is "external source"), **[10MHz In/Out]**, and finally set the same output frequency for each instrument to achieve synchronization of multiple instruments.

Number display format

You can format how decimal points and thousands separators in numeric parameters are displayed on the screen. This setting is saved in non-volatile memory and is not affected by a "factory reset".

- **Decimal point:** Click **decimal point** Item drop-down menu, you can set the decimal point to a period "." or a comma ",", the default is "."

- **Thousands separator:** Click **delimiter** Item drop-down menu, the separator can be set to period ".", comma ",", "empty" "Case" or "None". The decimal point and separator cannot be both a period or a comma.

brightness

Click **brightness** Item input box to set the brightness of the screen display.



buzzer

Click **buzzer** The switch of the item can choose to turn the sound on or off. After turning on the sound, a prompt will be issued when operating the instrument or when an error occurs.

Sound indication.

display time

Click **display time** The item switch can turn on or off the display of time. When the time display is turned on, the system time is displayed in "hh:mm (Hour:minute) "yyyy-mm-dd (year-month-day)" format is displayed in the notification area at the bottom right of the screen. The user can set the system time.

- **date:** Click **date** Input box, the date menu pops up, slide the dial up or down to adjust the date, click **OK** button, done
Date modified. Click  button to close the menu and discard changes.
- **time:** Click **time** Input box, the time setting menu pops up, slide the dial up or down to adjust the time, click **OK** button,
Completion time modification. Click  button to close the menu and discard changes.

17.4 About this instrument

exist **Auxiliary** Click in the menu **about**, you can view information such as the device model and version in the menu.

- **model**

Product number.

- **serial number**

Product serial number, the unique identification of the product.

- **Calibration date**

The last time the instrument was successfully calibrated.

- **Simulated hardware version**

The version number of the simulated hardware.

- **Digital hardware version**

The version number of the digital hardware.

- **AFG FPGA version**

AFG's FPGA version number.

- **AWG FPGA version**

FPGA version number of AWG.

- **Counter FPGA version**

FPGA version number of the frequency counter.

- **FGen SubSystem version**

Function generator version number.

- **UI SubSystem version**

User interface version number.

- **WebServer SubSystem version**

Network service system version number.

- **Runtime System version**

Running system version number.

17.5 Screenshot settings

The user can set the content displayed on the screen to be saved to the memory in the form of different pictures. exist

Auxiliary

Click in the menu

screenshot

picture enter the screenshot settings menu. You can set the screenshot format to "BMP" or "PNG".

Click below the main interface Screenshots Press the button and the interface screenshot will be stored in the specified format. Screenshots are stored in internal memory by default in the storage.

17.6 Options

exist Auxiliary

Click in the menu

Options list

You can check the installation status of options. Please refer to the steps for installing options. [View option information and select software installation](#) chapter.

17.7 Open Source Statement

exist Auxiliary

Click in the menu

Open source statement

you can browse the open source software statement of this series of products in the pop-up window.

17.8 Self-test

exist Auxiliary

Click in the menu

Self-test

enter the "Self-Test" menu. Through the self-test function, users can test the equipment from the following aspects: carry out testing.

Key detection

Click

Keyboard detection

item to enter the keyboard detection interface (virtual front panel keys).

At this time, you can check whether the key functions are normal by pressing the keys on the front panel of the instrument and rotating the knob, and observing whether the virtual keys are highlighted. If the corresponding virtual key is not highlighted, there may be a problem with the key. Click the button on the lower right side of the interface to exit the keyboard detection interface. Exit

Touch screen detection

Click

Touch screen detection

enter the touch screen detection interface.

Use your finger to point and draw on the screen. If there are corresponding lines displayed in the blank area and the box you pass turns into a box with a green background, it means that the touch screen function there is normal. Click the button on the lower left side of the interface to exit the touch screen detection interface. Exit

Screen detection

Click

Screen detection

Option, enter the screen detection interface to detect whether there are dead pixels on the screen.

There are 15 screen detection interfaces in total. Click the screen to switch to the next screen detection interface. Click on the screen detection interface in the upper Exit key to exit left corner of the interface.

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Default function

DG900 Pro provides 1 power-on value storage location (AUTO_RECALL, which stores the state of the system when it was last powered off) and 5 custom status file storage locations (STATE_1 to STATE_5). Users can store instrument status to custom status file storage location and loaded when needed. The stored status includes set channel parameters, waveform parameters, system



system parameters, etc. Click  > **Default**, open the preset function menu, as shown in the figure below.



Figure 18.1 Preset function menu

Restore default settings

Click **default** > **application** click in the pop-up dialog box **confirm** , to restore the system to the factory default state. You can also press

lower front panel  keys to configure factory values. Please refer to the factory value [Table 18.1: Factory values](#).

Save instrument status

Click **STATE_1** to **STATE_5** one of them and click **save** the current system status can be stored in the internal non-transitory in the specified location in the volatile memory. If a status file already exists at the current location, performing a save operation will overwrite the existing file.

Call instrument status

When the status file already exists in the specified location, select the storage location and **application** > **confirm**, the instrument will load this status file click File.



hint

as an instrument *Boot settings* When set to "last value", when the instrument is powered on, it will automatically recall the system configuration (stored in AUTO_RECALL) when it was last powered off.

Delete status file

When a status file already exists in the specified location, select the storage location and click **delete** > **confirm**, the status stored at that location will be deleted. Status File.

Table 18.1 Factory values

parameter	Factory default
Channel output parameters	
Basic waveform	sine wave
Output mode	continuous wave
frequency	1 kHz
cycle	1ms
Amplitude	5 Vpp
offset	0 Vdc
Phase	0°
continuous wave	
square wave duty cycle	50%
sawtooth wave symmetry	50%
Pulse display type	pulse width
Pulse duty cycle	50%
Pulse width	500μs
Pulse rising edge	3ns
Pulse falling edge	3ns
Harmonic type	order
Harmonic order	2
harmonic phase	0°
Harmonic amplitude	5 Vpp
Arbitrary wave type	sinc
burst	
state	closure
Burst type	N cycles
burst period	10ms
trigger source	internal trigger
Number of cycles	1
Phase	0°
delay	0 seconds
Gating polarity	Positive polarity
idle level	first point
modulation	
AM	
modulation source	internal source
modulation waveform	sine wave
modulation frequency	100 Hz

parameter	Factory default
modulation depth	100%
carrier suppression	close
FM	
modulation source	internal source
modulation waveform	sine wave
modulation frequency	100 Hz
Frequency offset	100 Hz
phase modulation	
modulation source	internal source
modulation waveform	sine wave
modulation frequency	100 Hz
phase shift	90°
amplitude shift keying	
modulation source	internal source
polarity	Positive polarity
modulation rate	100 Hz
modulation amplitude	2 Vpp
frequency shift keying	
modulation source	internal source
polarity	Positive polarity
modulation rate	100 Hz
frequency hopping	10kHz
phase shift keying	
modulation source	internal source
polarity	Positive polarity
modulation rate	100 Hz
Phase	180°
pulse width modulation	
modulation source	internal source
modulation waveform	sine wave
modulation frequency	100 Hz
Duty cycle deviation	1%
width deviation	10 μs
Overlay	
Overlay ratio	50%
Superposition frequency	100 Hz
Overlay waveform	sine wave
Sweep	
Sweep type	linear sweep
trigger source	internal trigger
start frequency	100 Hz

parameter	Factory default
end frequency	1 kHz
Center frequency	550 Hz
frequency span	900 Hz
Marking frequency	550 Hz
Scan time	1 s
time of return	0 seconds
initial hold	0 seconds
terminate hold	0 seconds
sequence	
Sampling Rate	1MSa/s
filter mode	ordinary
frequency meter	
Frequency meter switch	close
statistics	close
high frequency suppression	close
input resistance	1 M Ω
gate time	automatic
Coupling type	AC
coupling	
coupling benchmark	CH1
frequency coupling	close
frequency coupling mode	Proportion
frequency coupling ratio	1
frequency coupling deviation	0
phase coupling	close
phase coupling mode	Proportion
Phase coupling ratio	1
phase coupling deviation	
Amplitude coupling	close
Amplitude coupling mode	Proportion
Amplitude coupling ratio	1
Amplitude coupling deviation	0
Channel configuration	
Synchronous switch	open
sync port	rear port
Sync polarity	Positive polarity
mark signal	close
reverse phase	close

parameter	Factory default
impedance	High resistance
trigger output	closure
System parameters	
buzzer	open
clock source	internal
Screenshot type	PNG

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remote control

There are mainly the following ways to remotely control this instrument:

• User-defined programming

Users can program and control the instrument through standard SCPI (Standard Commands for Programmable Instruments) commands. For detailed instructions on commands and programming, please refer to the *"Programming Manual"*.

• Use PC software

Usually users need to use PC-side software to send SCPI commands to the instrument. When the instrument is connected through the USB interface or LAN interface, the PC software supports searching for instrument resources and command line interaction.

• Web Control remote control

This product supports Web Control remote control. Web Control can display the interface displayed on the instrument screen in real time. Users can migrate instrument control to the control terminal (including PC, mobile phone, iPad and other smart terminals) through Web Control, thereby realizing remote control of the instrument. When the instrument is connected to the network, enter the instrument IP address in the browser address bar to access WebControl. When mDNS is turned on, you can also enter "hostname.local" in the browser address bar (see [Network authentication](#)) to access the WebControl. When changing the network configuration through Web Control, you need to log in. The user name and password for logging in to Web Control for the first time are "admin" and "rigol" respectively.

This device supports communication with the computer through USB interface and LAN interface to achieve remote control.



Notice

Before connecting the communication cable, please shut down the instrument to avoid damaging the communication interface of the instrument.

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Troubleshooting

1. If you press the power button, the screen of the instrument remains black with no display.

- a. Check whether the power connector is connected properly.
- b. Check whether the power button is pressed firmly.
- c. After completing the above checks, restart the instrument.
- d. If you still cannot use this product normally, please contact RIGOL.

2. The settings are correct but there is no waveform output:

- a. Check whether the output cable is tightly connected to the corresponding channel output port.
- b. Check the output cable for internal damage.
- c. Check whether the output cable and the test instrument are tightly connected.
- d. If you still cannot use this product normally, please contact RIGOL.

3. The U disk device cannot be recognized:

- a. Check whether the USB flash drive device can work normally when connected to other instruments or computers.
- b. Confirm that the U disk device used is in FAT32, NTFS or exFAT format. This instrument does not support hard disk type U disk devices.
- c. After restarting the instrument, insert the USB flash drive device for inspection.
- d. If you still cannot use the USB flash drive normally, please contact RIGOL.

4. The performance verification test failed:

- a. Check whether the signal source is within the calibration period (the calibration period is 1 year).
- b. Verify that the signal source has been warmed up for at least 20 minutes before testing.
- c. Check that the signal source is at the specified ambient temperature.
- d. Check whether the test is conducted in a strong magnetic environment.
- e. Check the signal source and the power supply of the test system for strong interference.
- f. Check whether the performance of the test equipment used meets the requirements.
- g. Make sure the test equipment used is within the calibration cycle.
- h. Check that the test equipment used is under the operating conditions required by its manual.
- i. Check that all connections are tight.

j. Check all cables for internal damage.

k. Ensure operations comply with the settings and procedures required in the Performance Verification Manual.

l. Check whether there are any errors in the error calculation.

m. Correctly understand the definition of "typical value" for this product: it refers to the performance indicators of the product under specific conditions.

5. Touch function cannot be used

a. Check if the touch screen is locked. If the screen is locked, unlock it.

b. Check the screen and fingers for oil, sweat, etc. If so, clean the screen and fingers.

c. Check whether the instrument is close to a strong magnetic field. If you are close to a strong magnetic field, such as a magnet, please stay away to eliminate the influence of the magnetic field.

d. If you still cannot use the touch screen normally, please contact RIGOL.

21.1 Appendix A: Accessories and Options

Ordering information	Order number
Host model	
70 MHz bandwidth, 1.25 GSa/s sampling rate	DG902Pro
150 MHz bandwidth, 1.25 GSa/s sampling rate	DG912Pro
200 MHz bandwidth, 1.25 GSa/s sampling rate	DG922Pro
Standard accessories	
Power adapter that complies with the country's standards	— —
USB data cable	— —
A BNC cable	CB-BNC-BNC-MM-100
Upgrade options	
32 Mpts/CH storage depth upgrade option	DG900Pro-3RL
Optional accessories	
40 dB attenuator (50 Ω , 1 W)	RA5040K

21.2 Appendix B: Warranty Summary

RIGOL TECHNOLOGIES CO., LTD. (hereinafter referred to as RIGOL) promises that the mainframe and accessories of the instruments it produces will be free of any material and workmanship defects during the product warranty period.

During the warranty period, if the product is proven to be defective, RIGOL will repair or replace it free of charge for the user. For detailed warranty regulations, please refer to the RIGOL official website or product warranty card. To obtain the full text of maintenance services or warranty instructions, please contact the RIGOL maintenance center or local offices.

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