

## ◆ Overview

The control instructions generally adopt the command line method, and the communication rate is 115200. The instructions are issued by the PC, and the machine parses and executes them, and then returns the results to the PC. The different commands are explained below.

The format of sending data is as follows:

Start bit	Operator	Function Code	Connector	Data field	End code
:	w r	0-99	=	Refer to the Description	CRLF <CR><LF>

Description:

- (1) The start bit is the colon (:) in the ASCII character table.
- (2) Operators are two lowercase characters in the ASCII character table, "w" is a write command to set various parameters, and "r" is a read command to return parameters in the machine.
- (3) The function code is the value in the ASCII character table, and the difference of the value represents different parameter settings.
- (4) Data field: The data field is equivalent to the operand of the command, the number is from 1 to 2048, and each data is distinguished by "," or ".". For example: w13=25786,0. The operand of this instruction is 3, the first operand is "25786", the output frequency is set to 25.786, the second operand is "0", and the unit of the set frequency is Hz. In short, this instruction sets frequency of channel 1 to 25.786 Hz.
- (5) End code: Each instruction ends with a carriage return + line feed, and <CR> represents a carriage return in the ASCII character table (in hexadecimal notation is 0x0d). <LF> is the newline character in the ASCII character table (in hexadecimal notation is 0x0a). The two ways to indicate carriage return and line feed.

### w command

#### Channel output status setting

The PC sends: w10=1,1. It means that the waveform output status of channels 1 and 2 is on.

The PC sends: w10=0,0. It means that the waveform output status of channels 1 and 2 is off.

#### Waveform setting

The PC sends: w11=0. It means that the output waveform of channel 1 is a sine wave.

The PC sends: w11=101. It means that set the channel output waveform to arbitrary waveform 01.

The PC sends: w12=0. It means that the output waveform of channel 2 is a sine wave.

The settings of other waveforms are as follows:

Channel 1	Waveform	Channel 2	
:w11=0.	Sine	:w12=0.	
:w11=1.	Square	:w12=1.	
:w11=2.	Pulse	:w12=2.	
:w11=3.	Triangle	And so forth	
:w11=4.	Slope		
:w11=5.	CMOS		
:w11=6.	DC level		
:w11=7.	Partial sine wave		
:w11=8.	Half wave		
:w11=9.	Full wave		
:w11=10.	Positive ladder wave		
:w11=11.	Negative ladder wave		
:w11=12.	Positive trapezoidal wave		
:w11=13.	Negative trapezoidal wave		
:w11=14.	Noise wave		
:w11=15.	Index rise		
:w11=16.	Index fall		
:w11=17.	Logarithmic rise		
:w11=18.	Logarithmic fall		
:w11=19.	Sinker Pulse		
:w11=20.	Multi-audio		
:w11=21.	Lorenz		
When":w11=101.", it means arbitrary wave 01, ":w11=102. ", it means arbitrary wave 02, and so on, until the maximum is 199, which means arbitrary wave 99.			

### Frequency setting

The PC sends: w13=25786, 1. Set the output frequency of channel 1 to 0.02586 and the unit is KHz.

The PC sends: w14=25786, 3. Set the output frequency of channel 2 to 25.786 and the unit is mHz.

### Other situations are as follows:

Channel 1	Channel 2
:w13=25786,0. Set to 25.786Hz	:w14=25786,0.
:w13=25786,1. Set to 0.025786KHz	:w14=25786,1.
:w13=25786,2. Set to 0.000025786MHz	And so forth
:w13=25786,3. Set to 25.786mHz	
:w13=25786,4. Set to 25.786uHz	

### Amplitude setting

The PC sends: w15=n. When n=30, set the amplitude output of channel 1 to 0.030v.

The PC sends: w16=n. When n=30, set the amplitude output of channel 2 to 0.030v.

### Offset setting

The PC sends: w17=1000. set the offset output of channel 1 to 0v.

The PC sends: w17=2500. set the offset output of channel 1 to 15v.

The PC sends: w17=1. set the offset output of channel 1 to -9.99v.

When setting the offset output of channel 2, just change :w17 to :w18, and the others remain unchanged.

For example: PC sent: w18=1. set the offset output of channel 2 to -9.99v.

### Duty cycle setting

PC sends: w19=n. When n=5000, set the duty cycle output of channel 1 to 50%.

The PC sends: w20=n. When n=5000, set the duty cycle output of channel 2 to 50%.

### Phase setting

The PC sends: w21=0. It means that the phase output is 0°, and the machine returns OK to indicate that the setting is successful.

The PC sends: w21=35999. The phase is 359.99°.

When setting the offset output of channel 2, just change: w21 to: w22 and the others will remain unchanged.

## Interface setting

The PC sends: w24=n. to set the interface, press SHIFT+6 on the instrument to view

PC send	Interface	PC send	PC send
:w24=0,1,0,0.	Select the default interface of CH1 channel	:w24=0,1,0,1.	Select the waveform interface
		:w24=0,1,0,2.	Select the frequency interface
		:w24=0,1,0,3.	Select the amplitude interface
		:w24=0,1,0,4.	Select the offset interface
		:w24=0,1,0,5.	Select the duty interface
		:w24=0,1,0,6.	Select the phase interface
		:w24=0,1,0,7.	The modulation interface
		:w24=0,1,0,8.	Select the type interface
		:w24=0,1,0,9.	Select the polarity interface
		:w24=0,1,0,a.	Select the source interface
		:w24=0,1,0,b.	Select the rate interface
:w24=0,1,0,c.	Select the amplitude interface in the modulation		
:w24=0,2,0,0.	Select the default interface of CH2 channel	The remaining interfaces can be viewed by pressing SHIFT+6 on the instrument.	
:w24=0,3,0,1.	Select clear memory interface in the system settings interface		
:w24=0,4,0,1.	Select the coupling interface in the measurement mode interface		
:w24=0,5,0,1.	Select the coupling interface in the technical mode interface		
:w24=0,6,0,1.	Select the sweep frequency channel in the sweep frequency interface		
:w24=0,7,0,1.	Select the voltage control channel interface in the voltage control frequency interface		
:w24=0,8,0,0.	Select P00 interface in programming mode interface		

## Sync setting

The PC sends: w25=n1,n2,n3,n4,n5,n6. The value of the operand in the synchronization setting.

(The value of n) is 1 or 0, 1 means synchronous, 0 means asynchronous, and when synchronous, channel 1 is the object of operation. The parameters corresponding to the number of operands are: w25=waveform, frequency, amplitude, offset, duty cycle, and external signal.

PC sends: w25=1,0,0,0,0,0. set the waveform synchronization (waveform amplitude offset duty cycle external signal asynchronous).

PC sends: w25=1,1,0,0,0,0. set frequency and waveform synchronization (amplitude offset duty cycle external signal asynchronous).

### **Save,load,clear**

The PC sends: w26=n1,n2. to save, load and clear the parameters.

The PC sends: w26=52,111., it means to load the parameter of 52 storage location.

The PC sends: w26=52,222., it means to save the parameter to the 52 storage location.

The PC sends: w26=57,333., it means to clear the parameter of the 57 storage location.

The PC sends: w26=n,444. It means to clear the parameters of all storage locations.

### **Sound setting**

The PC sends: w27=n. to set the key sound, when n=1, turn on the sound; when n=0, turn off the sound.

### **Brightness setting**

The PC sends: w28=n. to set the screen brightness, when n=80, it means that the brightness is adjusted to 80%.

### **Language setting**

The PC sends: w29=n. to set the system language, when n=0, the language is English; when n=1, the language is Chinese.

### **Preset wave number [0, 39]**

The PC sends: w30=n. to set the preset wave number, when n=16, the preset wave number in the instrument is 16.

### **Arbitrary wave number [0, 99]**

The PC sends: w31=n. to set the preset arbitrary wave number. When n=16, the preset arbitrary wave number in the instrument is 16.

### Wave loading

The PC sends: w32=n. to set the waveform loading mode, when n=0, automatic waveform loading; when n=1, fast waveform loading.

### Frequency fine tuning

The PC sends: w33=n. to set the frequency fine-tuning, when n=50, the frequency fine-tuning is 50.

### Modulation type setting

The PC sends: w40=n1, n2. to set the modulation type.

n1 means CH1 channel ; n2 means CH2 channel ; n1= [0,7], n2= [0,7].

PC sends	CH1	CH2
:w40=0,0.	AM	AM
:w40=1,1.	FM	FM
:w40=2,2.	PM	PM
:w40=3,3.	ASK	ASK
:w40=4,4.	FSK	FSK
:w40=5,5.	PSK	PSK
:w40=6,6.	PULSE	PULSE
:w40=7,7.	BURST	BURST

### Modulation built-in wave type

The PC sends: w41=n1, n2. to set the modulation built-in wave type.

n1 means CH1; n2 means CH2; n1= [0,9], n2= [0,9].

PC sends	CH1	CH2
:w41=0,0.	Sine	Sine
:w41=1,1.	Square	Square
:w41=2,2.	Triangle	Triangle
:w41=3,3.	Rising saw tooth	Rising saw tooth
:w41=4,4.	Falling saw tooth	Falling saw tooth
:w41=5,5.	Arbitrary wave 101	Arbitrary wave 101
:w41=6,6.	Arbitrary wave 102	Arbitrary wave 102
:w41=7,7.	Arbitrary wave 103	Arbitrary wave 103
:w41=8,8.	Arbitrary wave 104	Arbitrary wave 104

:w41=9,9.	Arbitrary wave 105	Arbitrary wave 105
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### Modulation source selection [Internal, External]

The PC sends: w42=n1, n2. to set the internal and external signal source.

n1 means CH1; n2 means CH2; n1= [0,1], n2= [0,1].

PC sends	CH1	CH2
:w42=0,0.	Internal	Internal
:w42=1,1.	External	External

### CH1 built-in wave frequency

The PC sends: w43=n. to set the CH1 built-in wave frequency; n= [0,1000000000].

For example: The PC sends: w43=500000. The frequency of the built-in wave of CH1 is 500Hz.

### CH2 built-in wave frequency

The PC sends: w44=n. to set the CH2 built-in wave frequency; n= [0,1000000.000].

For example: The PC sends: w44=500000. The frequency of the built-in wave of CH2 is 500Hz.

### CH1 AM modulation depth

The PC sends: w45=n. to set the CH1 AM modulation depth; n= [0,2000].

For example: The PC sends: w45=1000. CH1 AM modulation depth is 100.0%.

### CH2 AM modulation depth

The PC sends: w46=n. to set the CH2 AM modulation depth; n= [0,2000].

For example: The PC sends: w46=1000. CH2 AM modulation depth is 100.0%.

### CH1 FM frequency deviation

The PC sends: w47=n. to set the CH1 FM frequency deviation; n=[0,MAXF]; the minimum accuracy is 0.1Hz.

For example: The PC sends: w47=5000. CH1 FM frequency deviation is 500.0Hz.

### CH2 FM frequency deviation

The PC sends: w48=n. to set the CH2 FM frequency deviation; n=[0,MAXF]; the minimum accuracy is 0.1Hz.

For example: The PC sends: w48=5000. CH2 FM frequency deviation is 500.0Hz.

### CH1 FSK Hopping frequency

The PC sends: w49=n. to set the CH1 FSK hopping frequency; n=[0,MAXF]; the minimum accuracy is 0.1Hz.

For example: The PC sends: w49=1000. CH1 FSK hopping frequency is 100.0Hz.

### **CH2 FSK Hopping frequency**

The PC sends: w50=n. to set the CH2 FSK hopping frequency; n=[0,MAXF]; the minimum accuracy is 0.1Hz.

For example: The PC sends: w50=1000. CH2 FSK hopping frequency is 100.0Hz.

### **CH1 PM phase deviation**

The PC sends: w51=n. to set the CH1 PM phase deviation; n=[0,359.9°]; the minimum accuracy is 0.1°.

For example: The PC sends: w51=1800. The PM phase deviation of CH1 is 180.0°.

### **CH2 PM phase deviation**

The PC sends: w52=n. to set the CH2 PM phase deviation; n=[0,359.9°]; the minimum accuracy is 0.1°.

For example: The PC sends: w52=1800. CH2 PM phase deviation is 180.0°.

### **CH1 pulse width**

The PC sends: w53=n. to set the CH1 pulse width; n=[0,4000000000] indicates the value range; the minimum accuracy is 0.001us, and the maximum is 0.4s.

For example: The PC sends: w53=20000. The pulse width of CH1 is 20.000us.

### **CH2 pulse width**

The PC sends: w54=n. to set the CH2 pulse width; n= [0,4000000000] represents the value range; the minimum accuracy is 0.001us, and the maximum is 0.4s.

For example: The PC sends: w54=20000. The pulse width of CH2 is 20.000us.

### **CH1 pulse period**

The PC sends: w55=n. to set the CH1 pulse period; n= [0,4000000000] indicates the value range; the minimum accuracy is 0.01us, and the maximum is 4s.

For example: The PC sends: w55=20000. The pulse period of CH1 is 200.00us.

### **CH2 pulse period**

The PC sends: w56=n. to set the CH2 pulse period; n= [0,4000000000] indicates the value range; the minimum accuracy is 0.01us, and the maximum is 4s.



For example: The PC sends: w55=20000. The pulse period of CH2 is 200.00us.

### **Pulse wave inversion [normal, inversion]**

The PC sends: w57=n1,n2. to set the pulse wave inversion.

n1 means CH1; n2 means CH2; n1=[0,1], n2=[0,1].

PC sends	CH1	CH2
:w57=0,0.	Normal	Normal
:w57=1,1.	Inversion	Inversion

### **Burst wave idle [zero position, positive maximum, negative maximum]**

The PC sends: w58=n1,n2. to set the burst wave to be idle.

n1 means CH1; n2 means CH2; n1=[0,2], n2=[0,2].

PC send	CH1	CH2
:w58=0,0.	Zero	Zero
:w58=1,1.	Positive max.	Positive max.
:w58=2,2.	Negative max.	Negative max.

### **Set polarity [positive polarity, negative polarity]**

The PC sends: w59=n1, n2. to set the polarity.

n1 means CH1; n2 means CH2; n1=[0,1], n2=[0,1].

PC send	CH1	CH2
:w59=0,0.	Positive polarity	Positive polarity
:w59=1,1.	Negative polarity	Negative polarity

### **Set the trigger source [key, internal, external AC, external DC]**

The PC sends: w60=n1,n2. to set the trigger source.

n1 means CH1; n2 means CH2; n1=[0,3], n2=[0,3].

PC sends	CH1	CH2
:w60=0,0.	Key	Key
:w60=1,1.	Internal	Internal
:w60=2,2.	External AC	External AC
:w60=3,3.	External DC	External DC

### Set the number of burst pulse

The PC sends: w61=n1,n2. to set the burst pulse number.

n1 means CH1; n2 means CH2 ; n1=[0,1000000000], n2=[0,1000000000].

For example: The PC sends: w61=20000,10000. CH1 burst pulse number is 20000, CH2 burst pulse number is 10000.

### Measurement function

The PC sends: w62=n1,n2,n3. to set the measurement function.

n	Range	Description
n1	[0,1]	0: AC (Ext.IN) coupling
		1: DC (Ext.IN) coupling
n2	[1,10000]	Gate time
n3	[0,1]	0: High frequency
		1: Low frequency

The PC sends: w63=n. to set the measurement switch; n=[0,1].

PC sends	Measurement switch
:w63=0.	Off
:w63=1.	On

### Sweep voltage control function

The PC sends: w64=n1,n2,n3,n4. to set the sweep function.

n	Range	Description
n1	[0,1]	0: CH1
		1: CH2
n2	[1,64000]	Sweep time
n3	[0,2]	0: Sweep direction: increasing
		1: Sweep direction: decreasing
		2: Sweep direction: back and forth
n3	[0,1]	0: Sweep mode: linear
		1: Sweep mode: logarithm

The PC sends: w65=n1,n2. to set the frequency sweep voltage control switch; n=[0,1]; n1 frequency sweep switch, n2 voltage control switch.

PC sends	Sweep switch	Voltage control switch
:w65=0,1.	Off	On
:w65=1,0.	On	Off

The PC sends: w66=n. to set the start frequency;; w66=100. indicates the start frequency is 10.0Hz.

The PC sends: w67=n. to set the end frequency;; w67=1000. indicates the end frequency is 100.0Hz.

The PC sends: w68=n. to set the start amplitude;; w68=1000. indicates the start amplitude is 1.000Vpp.

The PC sends: w69=n. to set the end amplitude;; w69=8000. indicates the end amplitude is 8.000Vpp.

The PC sends: w70=n. to set the start duty cycle;; w70=1000. indicates the start duty cycle is 10.00%.

The PC sends: w71=n. to set the end duty cycle;; w71=8000. indicates the end duty cycle is 80.00%.

The PC sends: w72=n. to set the minimum voltage calibration;; w72=1000. indicates the minimum voltage calibration is 1000.

The PC sends: w73=n. to set the maximum voltage calibration;; w73=45789. indicates the minimum voltage calibration is 45789.

### Set trigger

The PC sends: w74=n1,n2. to set the trigger; n=[0,1]; n1 means CH1 trigger, n2 means CH2 trigger.

PC send	CH1	CH2
:w74=0,1.	Off	On
:w74=1,0.	On	Off

### r command

The r command is a read command, and its command format is basically the same as the write command. The description will not be repeated here.

Examples of machine return commands below

PC sends	Machine command	return	Description
:r10=0.	:r10=1,1.		Channel 1 and 2 waveform output status is on
:r11=0.	:r11=001.		The waveform output of channel 1: square wave
:r12=0.	:r12=001.		The waveform output of channel 2: square wave
:r13=0.	:r13=00001000000 0,0.		The output frequency of channel 1: 10000.000Hz
:r14=0.	:r14=00001000000 0,0.		The output frequency of channel 2: 10000.000Hz
:r15=0.	:r15=05000.		The amplitude output of channel 1 : 5.000Vpp
:r16=0.	:r16=05000.		The amplitude output of channel 2 : 5.000Vpp
:r17=0.	:r17=1000.		The offset output of channel 1: 0.00V
:r18=0.	:r18=1000.		The offset output of channel 2: 0.00V
:r19=0.	:r19=5000.		The duty cycle output of channel 1: 50%
:r20=0.	:r20=5000.		The duty cycle output of channel 2: 50%
:r21=0.	:r21=00000.		The phase of channel 1: 0°
:r22=0.	:r22=00000.		The phase of channel 2: 0°
:r24=0.	:r24=00,03,00,04.		Select the Language interface in the system interface
:r25=0.	:r25=110000.		Frequency and waveform are synchronized(amplitude, offset, duty cycle and external signal are asynchronous)
:r26=0.	:r26=55.		The current parameters are saved in position 55.
:r27=0.	:r27=1.		Key sound is on
:r28=0.	:r28=095.		The current system brightness is 95%.
:r29=0.	:r29=1.		Chinese interface
:r30=0.	:r30=21.		The built-in wave number in the instrument is 21.
:r31=0.	:r31=15.		The built-in arbitrary wave number in the instrument is 16.
:r32=0.	:r32=0.		The current waveform loading method is automatic waveform loading.
:r33=0.	:r33=50.		Frequency fine-tuning : 50
:r40=0.	:r40=3,3.		CH1: ASK, CH2: ASK

:r41=0.	:r41=1,0.	CH1 modulation built-in wave: square wave CH2 modulation built-in wave: sine wave
:r42=0.	:r42=0,0.	CH1 source: internal CH2 source: internal
:r43=0.	:r43=0000500000.	CH1 built-in wave frequency: 500.000Hz
:r44=0.	:r44=0000500000.	CH2 built-in wave frequency: 500.000Hz
:r45=0.	:r45=0800.	CH1 AM modulation depth: 80.0%
:r46=0.	:r46=0800.	CH2 AM modulation depth: 80.0%
:r47=0.	:r47=0000020000.	CH1 FM frequency deviation: 2000.0Hz
:r48=0.	:r48=0000020000.	CH2 FM frequency deviation: 2000.0Hz
:r49=0.	:r49=0000020000.	CH1 FSK hopping frequency: 2000.0Hz
:r50=0.	:r50=0000020000.	CH2 FSK hopping frequency: 2000.0Hz
:r51=0.	:r51=1800.	CH1 PM phase: 180.0°
:r52=0.	:r52=1800.	CH2 PM phase: 180.0°
:r53=0.	:r53=0000000100.	CH1 pulse width: 0.100us
:r54=0.	:r54=0000000100.	CH2 pulse width: 0.100us
:r55=0.	:r55=0000001000.	CH1 pulse period: 10.00us
:r56=0.	:r56=0000001000.	CH2 pulse period: 10.00us
:r57=0.	:r57=1,0.	CH1 pulse wave: reverse CH2 pulse wave: normal
:r58=0.	:r58=1,0.	CH1 burst idle mode: positive maximum CH2 burst idle mode: zero position
:r59=0.	:r59=1,0.	CH1 polarity: negative CH2 polarity: positive
:r60=0.	:r60=3,0.	CH1 trigger mode: external trigger (DC) CH2 trigger mode: key trigger
:r61=0.	:r61=0000500001,0 000000555.	CH1 burst pulse number: 50001 CH2 burst pulse number: 555
:r62=0.	:r62=0,00020,0.	Coupling mode in measurement function: AC (Ext.IN) Gate time: 0.020s Measurement mode: high frequency (>2kHz)
:r63=0.	:r63=1.	Measurement in progress
:r64=0.	:r64=0,01000,0,0.	Sweep channel: CH1 Sweep time: 10.00s Sweep direction: increasing Sweep mode: linear

:r65=0.	:r65=0,0.	Sweep voltage control status: off
:r66=0.	:r66=0000010000.	Start frequency: 1000.0Hz
:r67=0.	:r67=0000100000.	End frequency: 10000.0Hz
:r68=0.	:r68=01000.	Start amplitude: 1.000Vpp
:r69=0.	:r69=08000.	End amplitude: 1.000Vpp
:r70=0.	:r70=02000.	Start duty cycle: 20.00%
:r71=0.	:r71=08000.	End duty cycle: 80.00%
:r72=0.	:r72=00554.	Minimum voltage calibration value: 554
:r73=0.	:r73=45789.	Maximum voltage calibration value: 45789