
Operation Manual

TH7205/TH7210
Programmable AC Power Source
V1.0.6@2025.10

Tonghui Electronic Co.,Ltd.

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Declaration

The descriptions contained in this manual may not cover all information about this instrument. Introductions to the improvements of the instrument in performance, function, internal structure, outer appearance, accessories, packing material, etc. are subject to change without notice. If you find any inconformity of this manual with our instruments, please contact us for further consultation by the address listed on the cover.

Chapter 1 Introduction

Thank you for purchasing and using of our products. If you have questions after reading this manual, please contact your local distributor or call our company's engineers directly for further consultation.

1.1 Introduction of the Instrument

TH7200 series is a high-performance, high-precision, and multifunctional single-phase programmable AC/DC power supply. This series of instruments has been carefully developed over many years, based on the TH7200 series. By combining a high-speed linear amplifier and an arbitrary waveform signal generator, a high-precision programmable AC/DC power supply is achieved.

The main special features and advantages are as follows:

- 24-bit color 4.3-inch color LCD display
- Chinese/English operating interface
- Adjustable settings via rotary knob
- Support output switch control
- Simultaneously displays: AC voltage true RMS (Urms), DC voltage component (Udc), AC voltage positive peak (Upk+), AC voltage negative peak (Upk-), Current true RMS (Irms), DC current component (Idc), Current positive peak (Ipk+), Current negative peak (Ipk-), Voltage power factor (CFu), Current power factor (CFi), Active power (P), Total power (S), Reactive power (P), peak positive current (Ipk+), peak negative current (Ipk-), voltage crest factor (CFu), current crest factor (CFi), active power (P), total power (S), reactive power (Q), power factor (PF), and other measurement parameters
- Support setting start phase (0~359 °) and end phase (0~359 °)
- Built-in sine wave, square wave, triangle wave, clipping wave, spike trap wave, dimming wave; also support custom waveforms via CSV file import
- Support front and rear panel outputs
- Intelligent temperature-controlled fan with stepless speed adjustment based on temperature
- Retains previous settings upon power-up
- Support timer functionality
- Support RS232 (SCPI and MODBUS protocols), USB CDC, USB TMC, LAN for convenient data communication with PCs
- Support DC output, AC output, and AC/DC output
- Support over-current protection (HI-A), over-voltage protection (OVP), low-voltage protection (LVP), over-current protection (OCP), over-peak current protection (OCKP), over-power protection (OPP), over-temperature protection (OHP), and various hardware protections

Th7200 series single-phase programmable AC power supply includes the following models:

Model	Voltage	Current	Power
TH7205	300V	5.0A	500W
TH7210	300V	10.0A	1000W

1.2 Working Condition

1.2.1 Power Connection ⚡

- 1) Power supply: 100~120Vac or 200~240Vac
- 2) Power supply frequencies: 50~60Hz
- 3) Power range: 2kVA MAX
- 4) Power input terminals are located on the rear panel, marked as phase L, neutral N, and ground E.



1.2.2 Environment Temperature and humidity

TH7200 series programmable AC power supply is only allowed to be used indoors and in low-condensation areas. The general environmental requirements of this instrument are shown in table 1-2. The fan speed changes intelligently with the radiator temperature. When the radiator temperature reaches 60 °C, the fan accelerates. When the radiator temperature reaches 130 °C, the instrument shuts off the output.

Environment	Requirements
Operating Temperature	0°C~40°C
Operating Humidity	20%~80% (non-condensation)
Storage Temperature	-20 °C~70 °C
Operating Altitude	≤2000m
Pollution	Pollution level2
Safety	Safety class II

1.2.3 Precautions for usage

- 1) Please do not use the tester in dusty, vibrative, direct sunlight and corrosive gases and other adverse environments.
- 2) Please do not use damaged equipment. Before use of the instrument, please check if there are any cracks on the shell.
- 3) Please connect the device with the provided cable. Before operating the instrument, make sure the AC power supply is well grounded.
- 4) Before connecting to the device, check all the security labels on the device.
- 5) Please use wire with rated load. The capacity of all load wires must be able to withstand the maximum short-circuit output current of the power supply without overheating. If there are multiple loads, each pair of load wires must be able to safely carry the full load rated short-circuit output current of the power supply.
- 6) Please do not install replacement parts or make any unauthorized modification of the instrument.
- 7) Please do not use the device when the cover is removed or loose.
- 8) It is strictly prohibited to use this instrument on life support system or any other equipment with safety requirements.
- 9) Keep the instrument well ventilated to avoid overheating. Do not block the ventilation hole of the equipment to avoid internal temperature rising affecting the accuracy.
- 10) Please use dry cloth to clean the shell of the equipment. Do not clean the inside of the instrument.
- 11) Please do not switch the instrument frequently to avoid loss of stored data.
- 12) The instrument has been carefully designed to reduce clutter due to AC power input. However, it should still be used under low noise conditions. If that is inevitable, please install the power filter.
- 13) When the instrument is not used for a long time, please put it in the original box or similar box and stored in a ventilated room with temperature of 5°C~40°C and relative humidity less than 85% RH. Do not store the instrument in a corrosive atmosphere containing harmful impurities and should avoid direct sunlight.

1.2.4 Warm-up

For accurate measurement, the warm-up time should not be less than 30 minutes.

1.3 Safety and Symbols

1.3.1 Signs and Symbols

	ON (power switch closed)		Protective grounding terminal
	OFF (power switch open)		Ground terminal
	Warning sign		Power line ground
	Shock hazard sign		

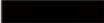
Table 1-3

1.3.2 Laws and regulations



CE label indicates that the instrument complies with all relevant European laws (a year indicates the year in which the design was approved).



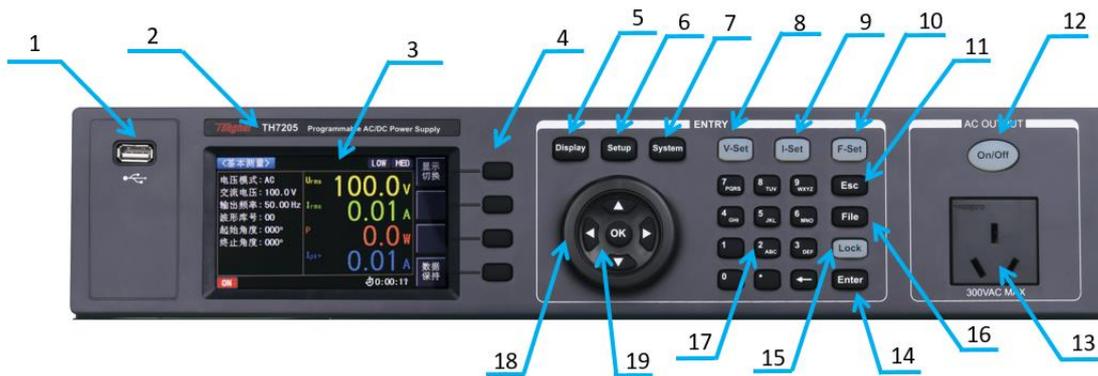
 This device complies with the marking requirements of WEEE directive (2002/96/EC), and this additional product label states that this appliance/electronic product should not be discarded in household waste. According to the WEEE directive annex I classification of the equipment, the instrument belongs to “monitor” products.

Chapter 2 Introduction

This chapter describes the basic operating procedures for the TH7200 series instruments. Before using the TH7200 series instruments, please read this chapter thoroughly so that you can quickly learn how to operate them.

2.1 Introduction to Front Panel

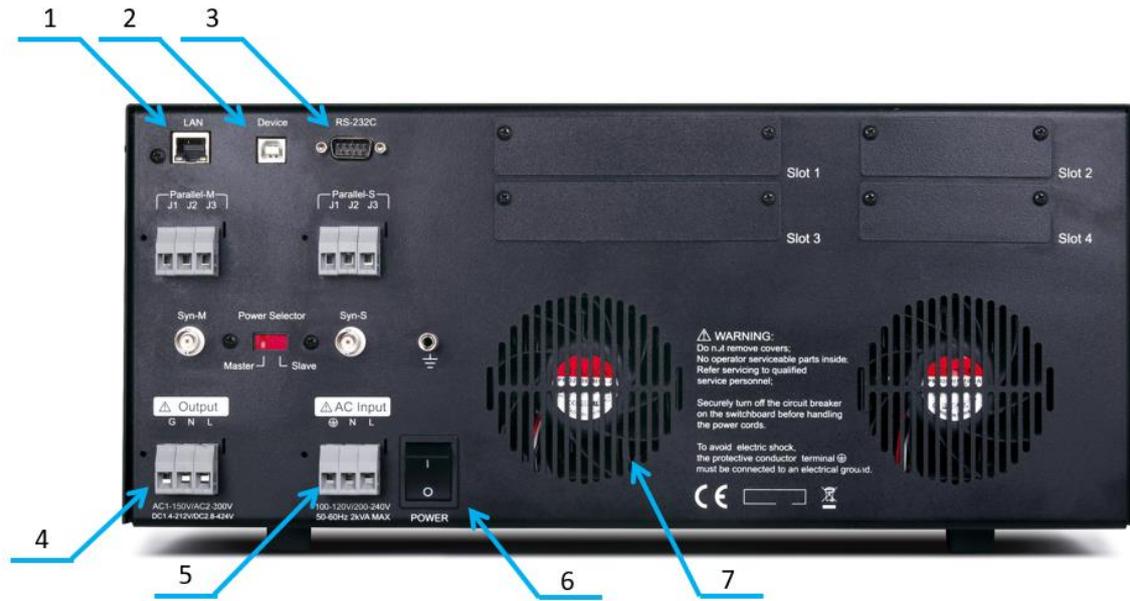
The front panel of the TH7200 series programmable AC/DC power supply is shown below.



Index	Name	Function
1	U disc interface	Read or store data
2	Power switch	Power switch
3	Trademark and models	Instrument trademark and models
4	Function buttons	Screen-labeled function keys
5	DISP	Quickly switch to measurement display page
6	SETUP	Quickly switch to measurement setting page
7	SYSTEM	Quickly switch to system setting page
8	V-SET	Voltage setting
9	I-SET	Current setting
10	F-SET	Frequency setting
11	ESC	Exit or cancel
12	ON/OFF	Output switch
13	Power Output Socket	Power output Socket
14	ENTER	Enter button
15	LOCK	Keyboard lock button
16	FILE	Internal Document Shortcut Key
17	Number pad and delete button	Number input and delete
18	Knob	Adjust the setting value or move the cursor
19	Arrow key and OK button	Move the cursor and enter

2.2 Introduction to Rear Panel

TH7200 series programmable AC power supply rear panel is shown below.



Index	Name	Function
1	LAN Interface	Network Interface.
2	Device Interface Terminal	USB CDC and USB TMC Interface
3	RS-232C Interface	Host Computer Serial Port
4	Output Terminal	Output Terminal
5	Input Terminal	Input Terminal
6	Power Switch	Power Switch
7	Fan Outlet	Fan Outlet

2.3 Display Zoon

The TH7200 series programmable ac power supply has a 24-bit color 4.3-inch color LCD screen with a resolution of 480×272. The content displayed on the screen is shown below.



1) Main menu zone

This area indicates the name of the current page

2) Parameters setup zone

This area is used to modify the test parameters

3) Status zone

This area is used to display system status information.

4) Measurement result display zone

This area shows the parameter results of the test. The parameter display 1 indicates the output voltage value, the parameter display 2 indicates the output current value, the parameter display 3 indicates the output power value, and the parameter display 4 indicates the peak current value.

5) Soft key zone

This area is used to display the function menu corresponding to the cursor area.

6) Prompt Area

This area displays various prompts and status information during system testing.

2.4 Basic Operation

It is important to note that you should never use sharp objects or your fingernails to touch the screen, as this may cause damage to the touchscreen. Our company will not be held responsible for any damage resulting from such actions.

2.4.1 Basic mode

- 1) Set output mode: Press the SETUP key, then press Basic Setup.
- 2) Set voltage mode: Press the direction keys \leftarrow or \rightarrow to move the cursor to Voltage Mode, then use the soft keys to select AC, DC+AC, or DC.
- 3) Set AC voltage: Press the direction keys \leftarrow or \rightarrow to move the cursor to AC Voltage, then use the numeric keys and ENTER key to set the output voltage.

- 4) Set output frequency: Press the direction keys  or  to move the cursor to Output Frequency, then set the output frequency using the numeric keys and ENTER key.
- 5) Test output: Press the DISP key, then press the ON/OFF key to output.

2.4.2 Step Mode

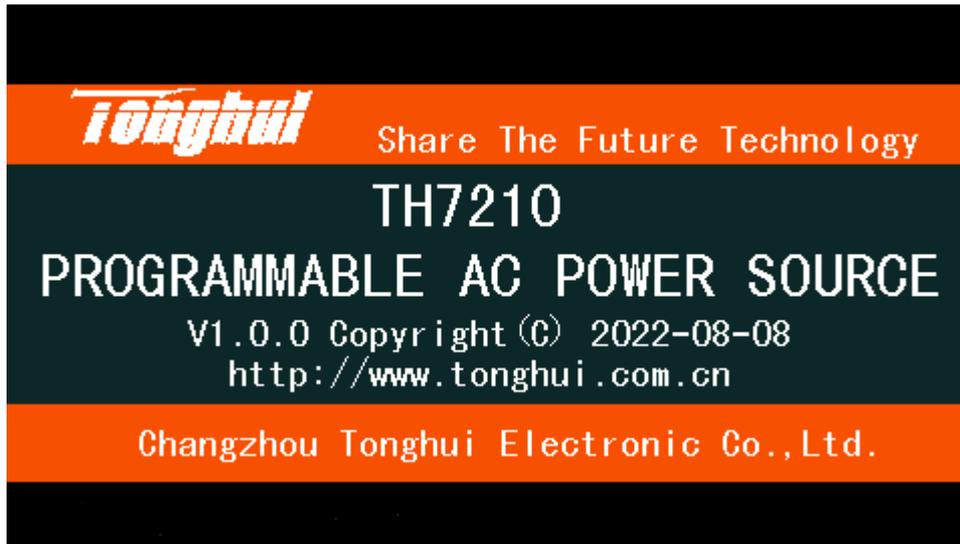
- 1) Set output mode: Press the SETUP key, then press Step Setup.
- 2) Configure sequence parameters: Use the direction keys  or  to move the cursor and set parameters including step number, DC voltage, AC voltage, output frequency, step output, and time.
- 3) Set step: Press the direction keys  or  to move the cursor to the step number. Use the numeric keys and ENTER key to set the step number, then configure the parameters under that step number as described in step
- 4) Repeat steps 2) and 3) to set all required steps.
- 5) Test output: Press the DISP key, then press the ON/OFF key to initiate output.

2.4.3 SIM Mode

- 1) Set output mode: Press the SETUP key, then press SIM Setup.
- 2) Set AC voltage: Press the direction keys  or  to move the cursor to AC Voltage. Use the numeric keys and ENTER key to set the output voltage. Press the direction keys  or  to move the cursor to T3 Voltage. Use the numeric keys and ENTER key to set the T3 output voltage.
- 3) Set output frequency: Press the direction keys  or  to move the cursor to Output Frequency. Use the numeric keys and ENTER key to set the output frequency.
- 4) Set simulation parameters: Press the direction keys  or  to move the cursor and set parameters such as T1 time, T2 time, T3 time, T4 time, T5 time, and loop cycle.
- 5) Test output: Press the DISP key, then the ON/OFF key, followed by the RUN key to output the simulation waveform.

2.5 Boot Instructions

Press the power switch in the lower left corner of the front panel of the instrument to turn the instrument on and display the boot screen. Figure 2-4 shows the boot screen of the TH7200 series programmable AC power supply. The boot screen includes some product information such as the trademark, instrument model and software version number of Tonghui Company.



If the user has turned on the password protection function, then the instrument will request to enter the power-on password. Enter the power-on password according to the screen display. This series of products is not set with the power-on password when leaving the factory, users can reset the power-on password according to their needs during use. For details, see Password on the <System Setup> page.

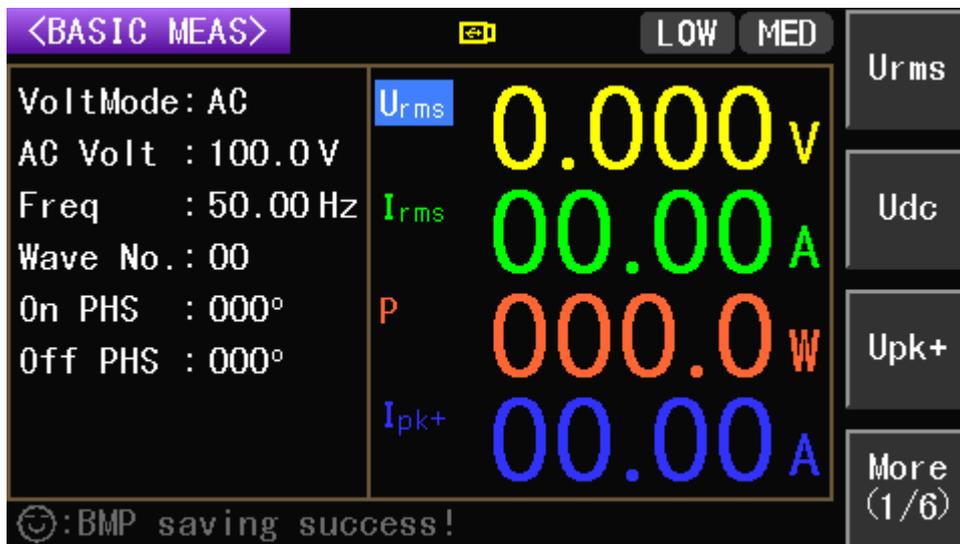
Chapter 3 Basic Operations and Description

3.1 <Measurement Display>

This interface displays measurement results and can be accessed via the software or the DISP key on the front panel. Depending on the test mode, the display interface is divided into the following three types:

3.1.1 Basic MEAS

3.1.1.1 Basic Parameters



- VoltMode

This parameter sets the voltage output mode, configurable as “AC”, “DC+AC”, or “DC”.

- AC Volt

This parameter sets the output AC voltage. Its range is 0.0V to 150.0V (LOW) or 0.0V to 300.0V (HIGH).

- Freq

This parameter sets the output frequency. Its range is 1.00 to 1000Hz. When the frequency is less than 100Hz, the resolution is 0.01Hz; when the frequency is greater than or equal to 100Hz, the resolution is 0.1Hz; when the frequency equals 1000Hz, the resolution is 1Hz.

- On PHS

This parameter sets the starting phase of the output waveform. Its range is 0~359°.

- Off PHS

This parameter sets the ending phase of the output waveform. Its range is 0~359°.

- Wave No.

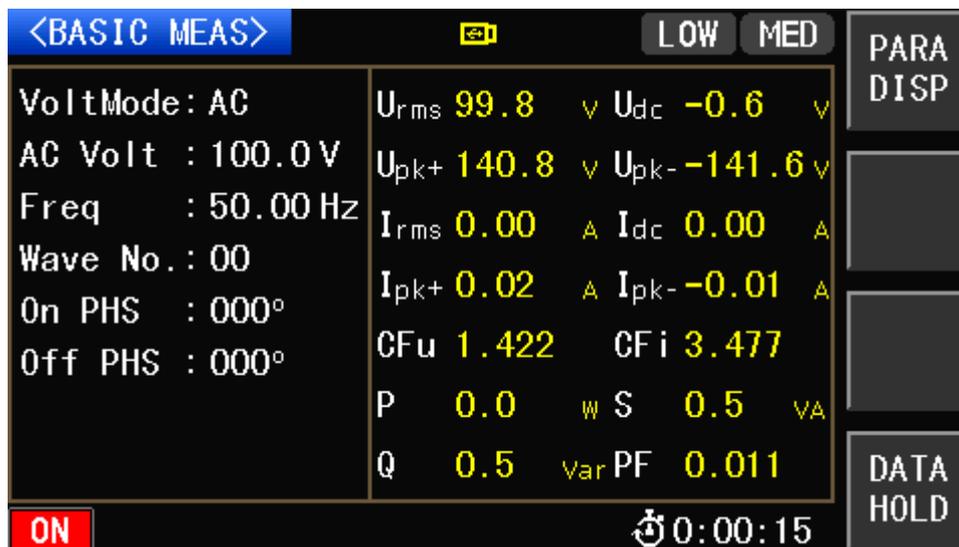
This parameter sets the waveform library number corresponding to the waveform library in <System Setup>→Waveform Setup. Change the waveform number to set the desired waveform.

3.1.1.2 Measurement Parameter Display



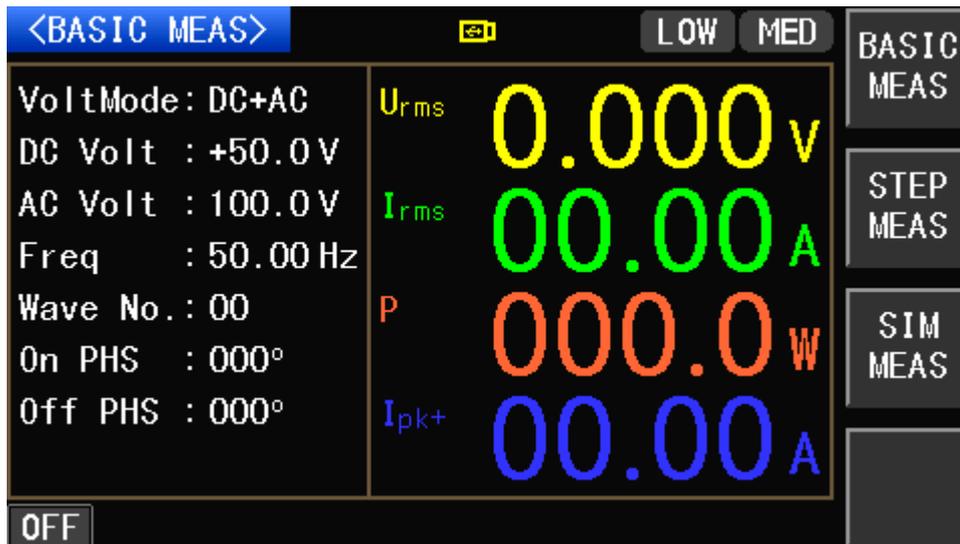
With the cursor on <Measurement Settings>, press the directional key \leftarrow to move the cursor to the measurement result parameter name. The soft key area allows selection of parameters such as Urms, Udc, Upk+, Upk-, Irms, Idc, Ipk+, Ipk-, P, PF, CFu, CFi, PF, etc.

3.1.1.3 Measurement Output Display



Press the ON/OFF output key to switch the measurement result display using the soft key PARA DISP.

3.1.1.4 Shortcut Key V-SET



1) When the voltage mode is set to “DC+AC”, pressing the V-SET key allows the soft key area to select between DC voltage and AC voltage.

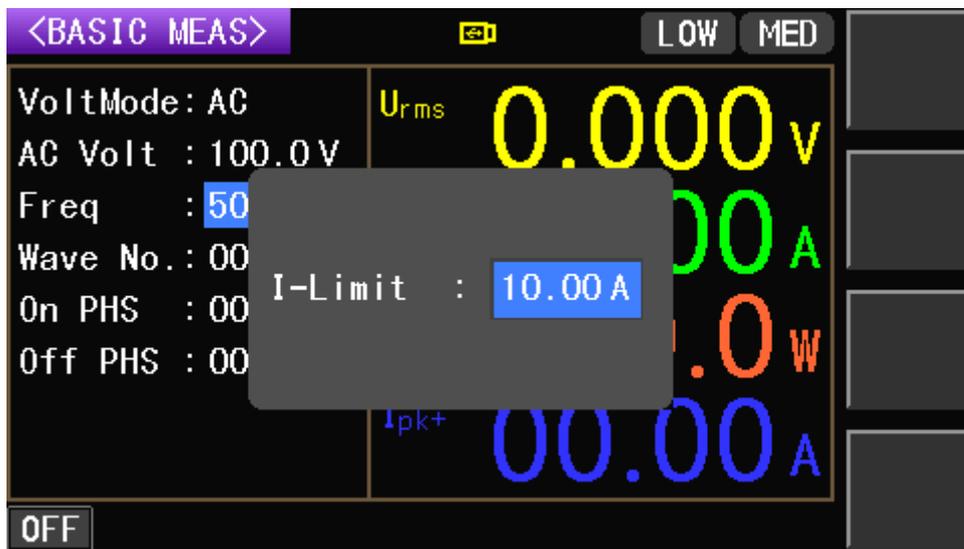
When the voltage mode is set to “AC”, pressing the V-SET key allows the soft key area to select AC voltage.

When the voltage mode is set to “DC”, pressing the V-SET key allows the soft key area to select DC voltage.



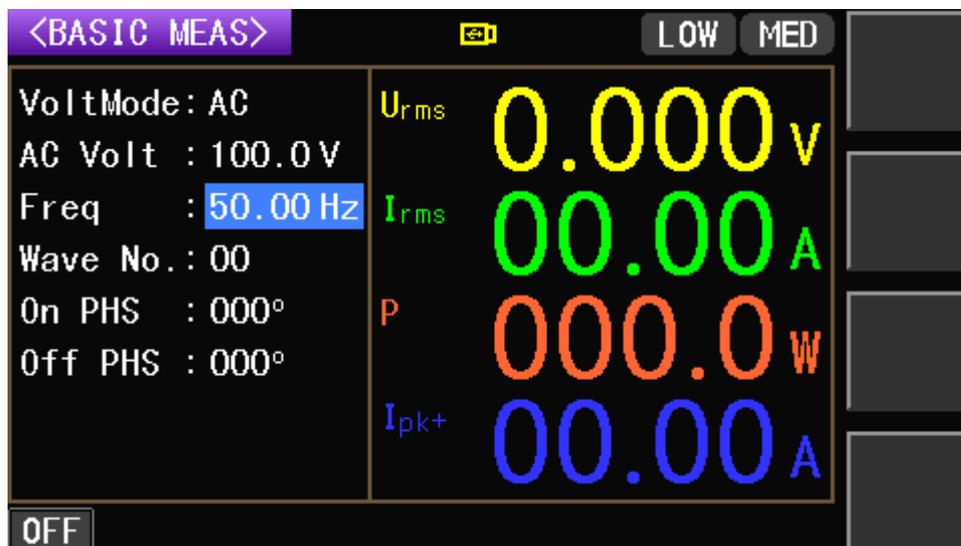
2) Press the soft key for AC voltage. Use the numeric keypad to modify the set value. When the output is active, adjust the value using the rotary knob.

3.1.1.5 Shortcut Key I-SET



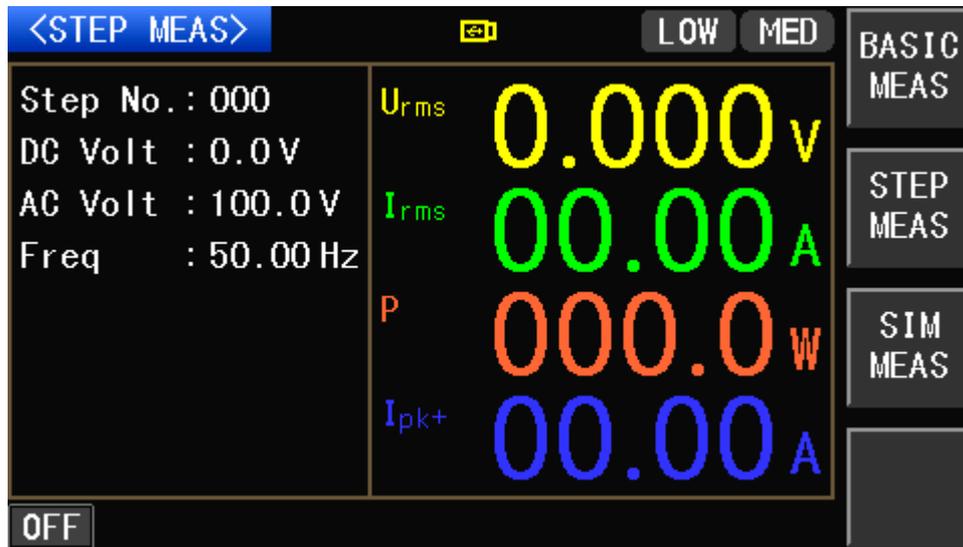
Press the I-SET key to bring up the current limit settings dialog. Use the numeric keypad to modify the set value.

3.1.1.6 Shortcut Key F-SET



Press the F-SET key to move the cursor to the output frequency setting value. Use the numeric keypad to modify the setting value. When the output is active, adjust the value using the rotary knob. This key is inactive when the voltage mode is set to "DC".

3.1.2 Step MEAS



- Step Number

This parameter indicates the current step number, ranging from 0 to 599. When the cursor is positioned on this parameter, operations such as delete, insert, and copy can be performed.

- DC Voltage

This parameter sets the output DC voltage. Its range is 0.0V to 212.0V (LOW) or 0.0V to 424.0V (HIGH).

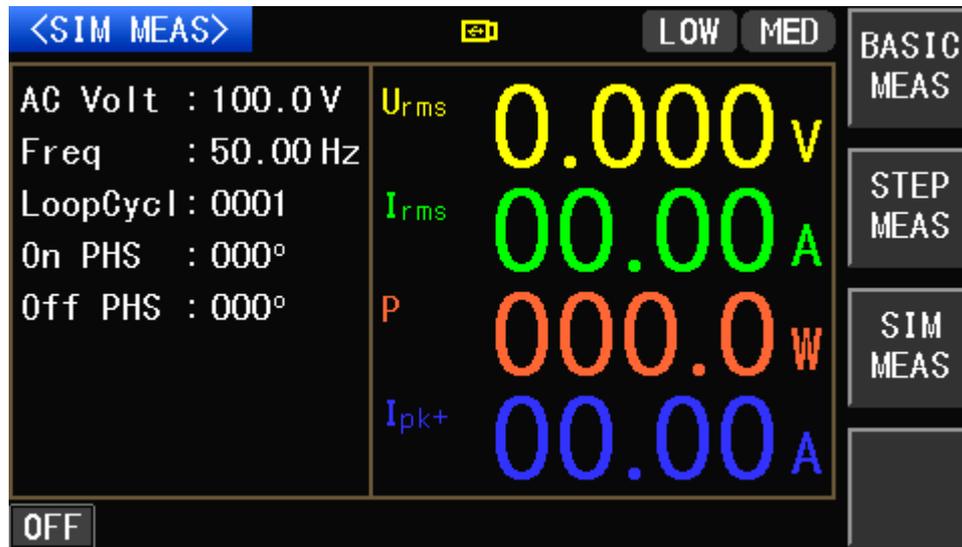
- AC Voltage

This parameter sets the output AC voltage. Its range is 0.0V to 150.0V (LOW) or 0.0V to 300.0V (HIGH).

- Output Frequency

This parameter sets the output frequency. Its range is 1.00 to 1000Hz. When the frequency is less than 100Hz, the resolution is 0.01Hz; when the frequency is greater than or equal to 100Hz, the resolution is 0.1Hz; when the frequency equals 1000Hz, the resolution is 1Hz.

3.1.3 SIM MEAS



- AC Voltage

This parameter sets the output AC voltage. Its range is 0.0V to 150.0V (LOW) or 0.0V to 300.0V (HIGH).

- Output Frequency

This parameter sets the output frequency. Its range is 1.00 to 1000Hz. When the frequency is less than 100Hz, the resolution is 0.01Hz; when the frequency is greater than or equal to 100Hz, the resolution is 0.1Hz; when the frequency equals 1000Hz, the resolution is 1Hz.

- Loop Cycle

This parameter indicates the repetition count for T1 to T5. Its range is 1 to 9999.

- On PHS

This parameter sets the starting phase of the output waveform. Its range is 0 to 359°.

- Off PHS

This parameter sets the ending phase of the output waveform. Its range is 0 to 359°.

3.2 MEAS Setup

3.2.1 Basic Setup

3.2.1.1 BASIC

- 1) AC Mode

<Basic Settings> → Basic, voltage mode set to AC, as shown in Figure 3-5:



Figure 3-5 Basic Settings AC Interface

- Voltage Mode

This parameter sets the voltage output mode, configurable as “AC”, “DC+AC”, or “DC”.

- AC Voltage

This parameter sets the output AC voltage. Its range is 0.0V to 150.0V (LOW) or 0.0V to 300.0V (HIGH).

- Output Frequency

This parameter sets the output frequency. Its range is 1.00 to 1000Hz. When the frequency is less than 100Hz, the resolution is 0.01Hz; when the frequency is greater than or equal to 100Hz, the resolution is 0.1Hz; when the frequency equals 1000Hz, the resolution is 1Hz.

- On Phase

This parameter sets the starting phase of the output waveform. Its range is 0~359 °.

- Off Phase

This parameter sets the ending phase of the output waveform. Its range is 0~359 °.

- Wave No.

This parameter sets the waveform library number corresponding to the waveform library in <System Setup>→Waveform Setup. Changing the waveform library number allows setting the desired waveform.

- 2) DC+AC Mode

<Basic Settings> → Basic, voltage mode set to DC+AC, as shown in Figure 3-5:

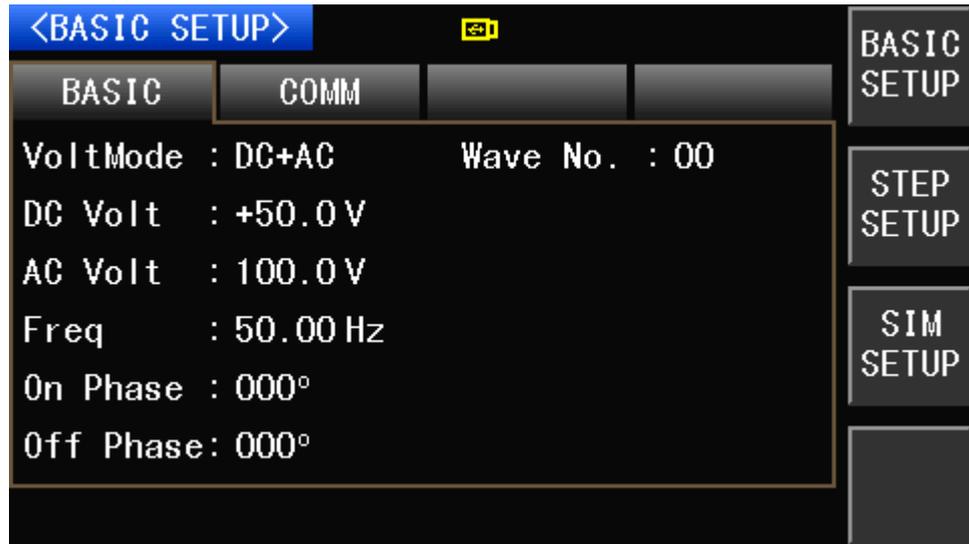


Figure 3-5 Basic Settings DC+AC Interface

- Voltage Mode

This parameter sets the voltage output mode, configurable as “AC”, “DC+AC”, or “DC”.

- DC Voltage

This parameter sets the output DC voltage. Its range is 0.0V to 212.0V (LOW) or 0.0V to 424.0V (HIGH).

- AC Voltage

This parameter sets the output AC voltage. Its range is 0.0V to 150.0V (LOW) or 0.0V to 300.0V (HIGH).

- Output Frequency

This parameter sets the output frequency. Its range is 1.00 to 1000Hz. When the frequency is less than 100Hz, the resolution is 0.01Hz; when the frequency is greater than or equal to 100Hz, the resolution is 0.1Hz; when the frequency equals 1000Hz, the resolution is 1Hz.

- On Phase

This parameter sets the starting phase of the output waveform. Its range is 0~359°.

- Off Phase

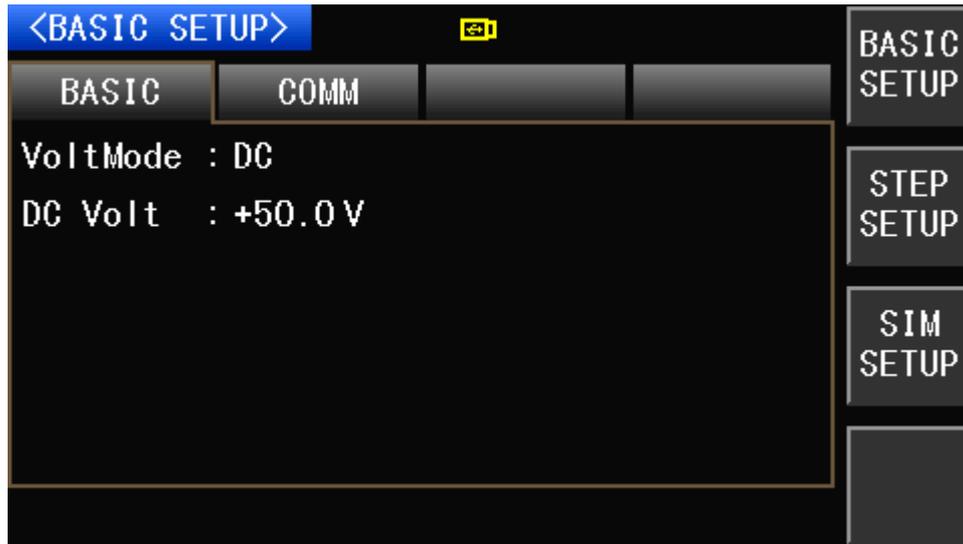
This parameter sets the ending phase of the output waveform. Its range is 0~359°.

- Wave No.

This parameter sets the waveform library number corresponding to the waveform library in <System Settings>→Waveform Settings. Changing the waveform library number allows setting the desired waveform.

3) DC Mode

<Basic Settings> → Basic, voltage mode set to DC, as shown in Figure 3-5:



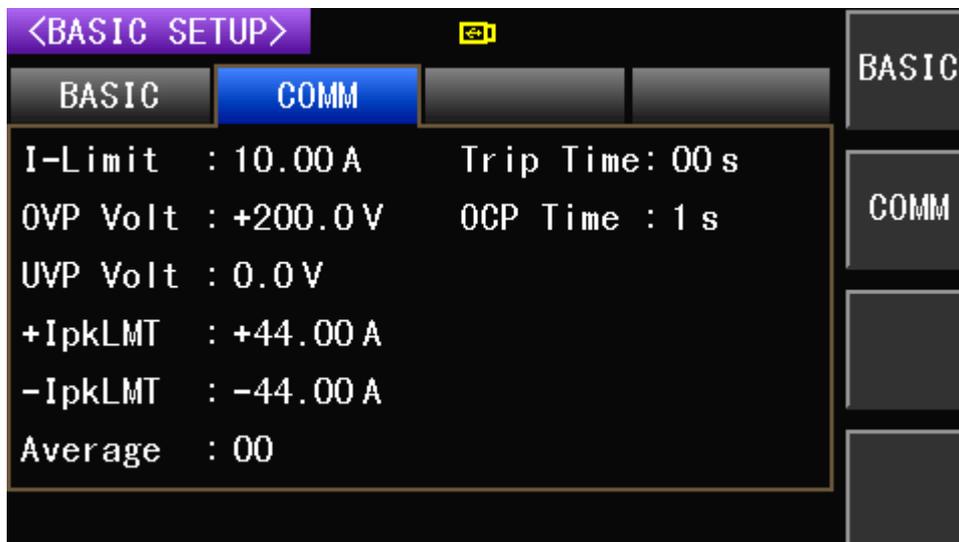
- Voltage Mode

This parameter sets the voltage output mode, configurable as “AC”, “DC+AC”, or “DC”.

- DC Voltage

This parameter sets the output AC voltage. Its range is -212.0V to 212.0V (LOW) or -424.0V to 424.0V (HIGH).

3.2.1.2 COMM



- Current Limit

This parameter defines the upper current limit setting. When the voltage range is set to LOW, the range is 0.01 to 10.0A (AC) or 0.01 to 7.0A (DC or DC+AC). When the voltage range is set to HIGH, the range is 0.01 to 5.0A (AC) or 0.01 to 3.5A (DC or DC+AC). When the output current exceeds this value, an alarm sounds, “HI-A” is displayed, and the output shuts off.

- Overvoltage Setting

This parameter sets the upper limit for output voltage protection. When the output voltage exceeds this value, overvoltage protection (OVP) activates and the output shuts off.

When the voltage mode is DC, the range is -262.0V to 262.0V (LOW) or -474.0V to 474.0V (HIGH).

When the voltage mode is AC, the range is 0.0V to 200.0V (LOW) or 0.0V to 350.0V (HIGH).

When the voltage mode is DC+AC, the range is -262.0V to 262.0V (LOW) or -474.0V to 474.0V (HIGH).

■ Undervoltage Setting

This parameter sets the upper limit protection for the output voltage. When the output voltage falls below this parameter value, the output activates undervoltage protection (OVP) and shuts down.

When the voltage mode is DC, the range is -262.0V to 262.0V (LOW) or -474.0V to 474.0V (HIGH).

When the voltage mode is AC, the range is 0.0V to 200.0V (LOW) or 0.0V to 350.0V (HIGH).

When the voltage mode is DC+AC, the range is -262.0V to 262.0V (LOW) or -474.0V to 474.0V (HIGH).

■ +Ipk Limit

This parameter sets the upper limit protection for positive peak current, with a range from 1.0A to 44.0A. When the output current exceeds this value, an alarm triggers, “OCKP” is displayed, and the output shuts off.

■ -Ipk Limit

This parameter sets the lower limit for positive peak current protection, ranging from -44.0A to -1.0A. When the output current exceeds this value, an alarm triggers, “OCKP” is displayed, and the output shuts off.

■ Average

This parameter sets the number of measurements averaged for output, ranging from 0 to 30.

■ Trip Time

This parameter defines the allowable output duration when current limits are exceeded. Its range is 0 to 10 seconds. A setting of 0 immediately shuts off output upon exceeding the current limit. A setting of 10 allows output to continue for 10 seconds after exceeding the limit before shutting off. This parameter is configurable when the voltage mode is set to “AC”.

■ OCP Time

This parameter specifies the duration for which output is permitted when the output current exceeds the rated current. Its range is 1 to 3 seconds. This parameter is configurable when the voltage mode is set to “AC”.

3.2.2 Step Setup

3.2.2.1 Step



■ Step Number

This parameter indicates the current step number, ranging from 0 to 599. When the cursor is moved to this parameter, operations such as delete, insert, and copy can be performed.

■ DC Voltage

This parameter sets the output DC voltage. Its range is -212.0V to 212.0V (LOW) or -424.0V to 424.0V (HIGH).

■ AC Voltage

This parameter sets the output AC voltage. Its range is 0.0V to 150.0V (LOW) or 0.0V to 300.0V (HIGH).

■ Output Frequency

This parameter sets the output frequency. Its range is 1.00 to 1000Hz. When the frequency is less than 100Hz, the resolution is 0.01Hz; when the frequency is greater than or equal to 100Hz, the resolution is 0.1Hz. When the frequency equals 1000Hz, the resolution is 1Hz.

■ On Phase

This parameter sets the starting phase of the output waveform. Its range is 0~359°.

■ Time

This parameter indicates the output time for the current step number. Units are hours, minutes, seconds, and milliseconds.

■ Step Count

This parameter indicates the number of cycles for the current step. Its range is 1 to 99999.

■ DCV Ramp

This parameter describes the variation characteristics of the DC voltage. The DC change for the first step transitions from 0.0V to the DC voltage of that step. The DC change for the second step transitions from the first step's DC voltage to the second step's DC voltage. Subsequent steps follow this pattern. The change occurs per cycle.

■ ACV Ramp

This parameter defines the AC voltage change characteristics. The AC change for the first step transitions from 0.0V to the first step's AC voltage. The AC change for the second step transitions from the first step's AC voltage to the second step's AC voltage. Subsequent steps follow this pattern. The change increment occurs per cycle.

■ Wave No.

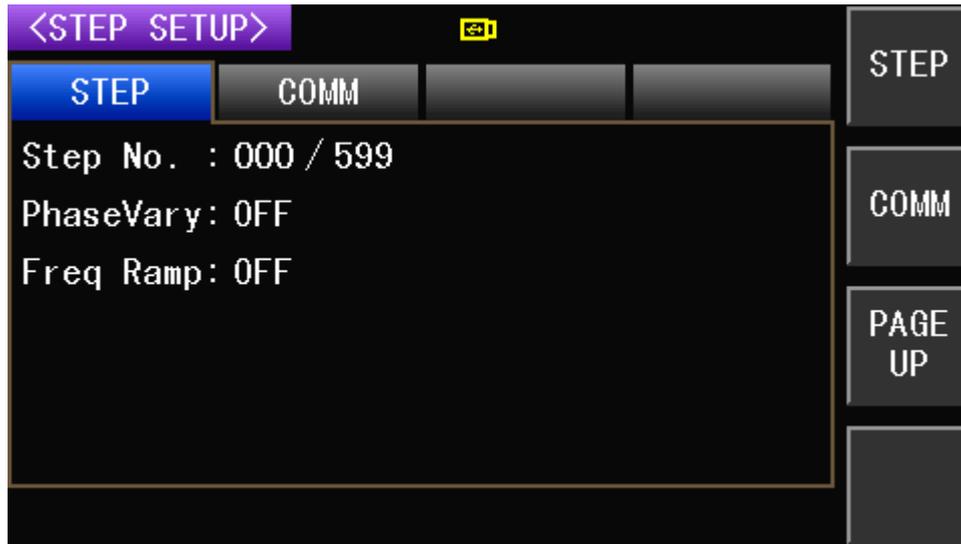
This parameter sets the waveform library number corresponding to the waveform library in <System Setup>→Waveform Setup. Changing the waveform library number allows setting the desired waveform.

■ Off Phase

This parameter sets the termination phase of the output waveform, with a range of 0 to 359°.

■ Step Output

This parameter indicates the output status of the current step. If output is required for the current step, the step output is set to 'ON'.



- PhaseVary

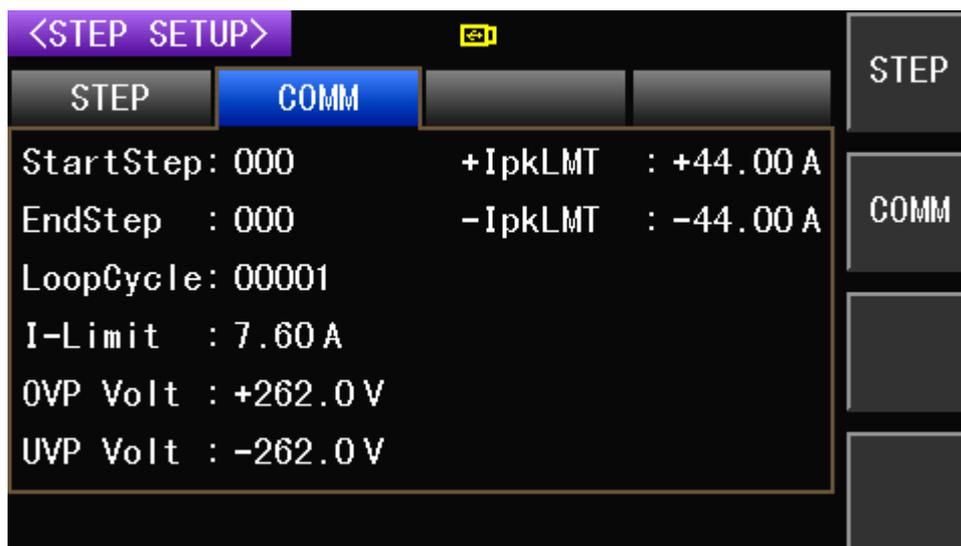
If the phase vary at step n+1 is 'off', then the On phase at step n equals its own On phase, and the Off phase equals the On phase at step n+1;

If the phase vary at step n+1 is 'on', then the On phase at step n equals its own On phase, and the Off phase equals the Off phase at step n.

- Frequency Ramp

This parameter defines the output frequency variation characteristics. The frequency change for the first step transitions from the step value to the output frequency of the first step. The frequency change for the second step transitions from the output frequency of the first step to the output frequency of the second step. Subsequent steps follow this pattern. The change step occurs per cycle.

3.2.2.2 COMM



- Start Step

This parameter indicates the starting step for the step output. Its range is 0 to 599.

- End Step

This parameter indicates the ending step for the step output. Its range is 0 to 599.

- Loop Cycle

This parameter indicates the number of cycles from the start step to the end step. Its range is 1 to 99999. Setting 99999 enables infinite cycling.

- I-Limit

This parameter defines the upper limit for current, ranging from 0.01A to 7.0A. When the output current exceeds this value, an alarm triggers, “HI-A” is displayed, and the output shuts off.

- OVP Volt

This parameter sets the upper limit for output voltage protection. When the output voltage exceeds this value, overvoltage protection (OVP) activates and the output shuts off. Its range is -262.0V to 262.0V (LOW) or -474.0V to 474.0V (HIGH).

- UVP Volt

This parameter sets the lower limit for output voltage protection. When the output voltage exceeds this parameter value, the output activates undervoltage protection (OVP) and shuts down. Its range is -262.0V to 262.0V (LOW) or -474.0V to 474.0V (HIGH).

- +Ipk Limit

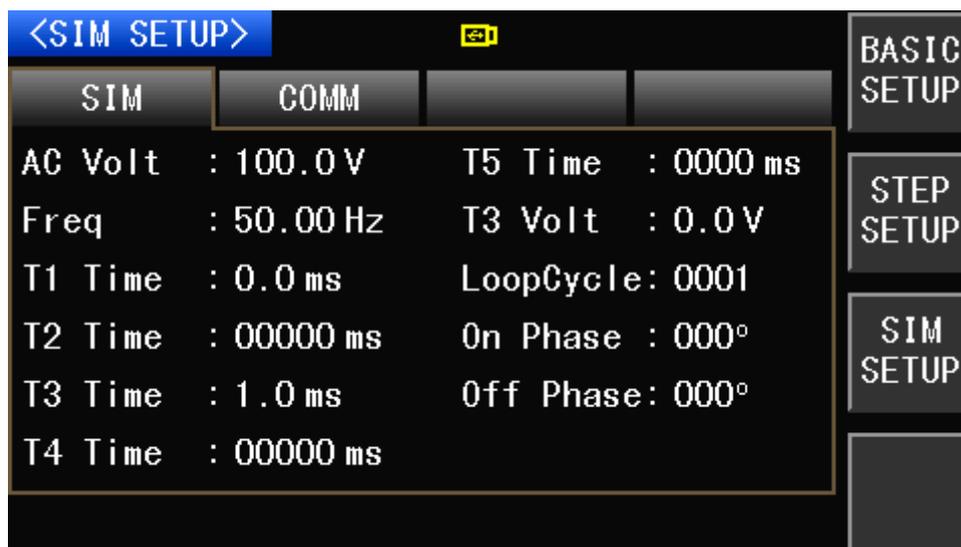
This parameter sets the upper limit for positive peak current protection, ranging from 1.0A to 44.0A. When the output current exceeds this value, an alarm triggers, “OCKP” is displayed, and the output shuts down.

- -Ipk Limit

This parameter sets the lower limit for positive peak current protection, with a range from -44.0A to -1.0A. When the output current exceeds this value, an alarm triggers, “OCKP” is displayed, and the output shuts down.

3.2.3 SIM Setup

3.2.3.1 SIM



- AC Voltage

This parameter sets the output AC voltage. Its range is 0.0V to 150.0V (LOW) or 0.0V to 300.0V (HIGH).

■ Output Frequency

This parameter sets the output frequency. Its range is 1.00 to 1000Hz. When the frequency is less than 100Hz, the resolution is 0.01Hz; when the frequency is greater than or equal to 100Hz, the resolution is 0.1Hz. When the frequency equals 1000Hz, the resolution is 1Hz.

■ T1 Time/T1 Phase

This parameter indicates the start time or phase of the voltage change. The T1 time range is 0.0 to 999.9 ms. The T1 phase range is 0 to 359 °.

■ T2 Time

This parameter indicates the time required for the voltage to rise or fall to the T3 voltage. Its range is 0 to 99999 ms.

■ T3 Time

This parameter indicates the duration of the voltage change. Its range is 1.0 to 9999.9 ms.

■ T4 Time

This parameter indicates the time required for the T3 voltage to rise or fall to the T5 voltage. Its range is 0 to 99999 ms.

■ T5 Time/T5 Period

This parameter indicates the duration from the end of voltage rise or fall until the state returns, or the number of cycles at the current frequency. The T5 time range is 0 to 9999 ms. The T5 period range is 0 to 9999.

■ T3 Voltage

This parameter represents the variation voltage. Its range is 0.0V to 150.0V (LOW) or 0.0V to 300.0V (HIGH).

■ Loop Cycle

This parameter indicates the number of repetitions for T1 to T5. Its range is 1 to 9999.

■ On Phase

This parameter sets the starting phase of the output waveform. Its range is 0 to 359 °.

■ Off Phase

This parameter sets the ending phase of the output waveform. Its range is 0 to 359 °.

3.2.3.2 Common



■ Cross Polarity

This parameter indicates the polarity at which voltage variation begins. Cross polarity can be set to “+” or “-” . When set to “-,” the phase changes by 180 °

■ T1 Type

This parameter indicates whether the start of voltage variation is expressed in time or phase. T1 type can be set to “Time” or “Phase.”

■ T5 Type

This parameter indicates whether the return state duration is expressed in time or in cycles. T5 Type can be set to “Time” or “Cycle”.

■ I-Limit

This parameter defines the upper limit for current setting. When the voltage range is LOW, the range is 0.01~10.0A. When the voltage range is HIGH, the range is 0.01~5.0A. When the output current exceeds this value, an alarm triggers, “HI-A” is displayed, and the output shuts off.

■ Overcurrent Output

This parameter enables or disables constant output during overload current conditions. When set to “On,” the output voltage decreases as load increases, maintaining constant output at the current limit value. (Note: This function activates only when the output current exceeds the current limit setting.) When set to “Off,” the constant output function during overload is disabled.

■ OVP Volt

This parameter configures the upper limit protection for output voltage. When the output voltage exceeds this value, overvoltage protection (OVP) activates, shutting down the output. Its range is 0.0V to 200.0V (LOW) or 0.0V to 350.0V (HIGH).

■ UVP Volt

This parameter sets the upper limit for output voltage protection. When the output voltage exceeds this value, the output activates under-voltage protection (OVP) and shuts down. The range is 0.0V to 200.0V (LOW) or 0.0V to 350.0V (HIGH).

■ +Ipk Limit

This parameter sets the upper limit for positive peak current protection, ranging from 1.0A to 44.0A. When the output current exceeds this value, an alarm triggers, “OCKP” is displayed, and the output shuts off.

■ -Ipk Limit

This parameter sets the lower limit for positive peak current protection. Its range is -44.0A to -1.0A. When the output current exceeds this value, an alarm triggers, “OCKP” is displayed, and the output shuts off.

■ Trip Time

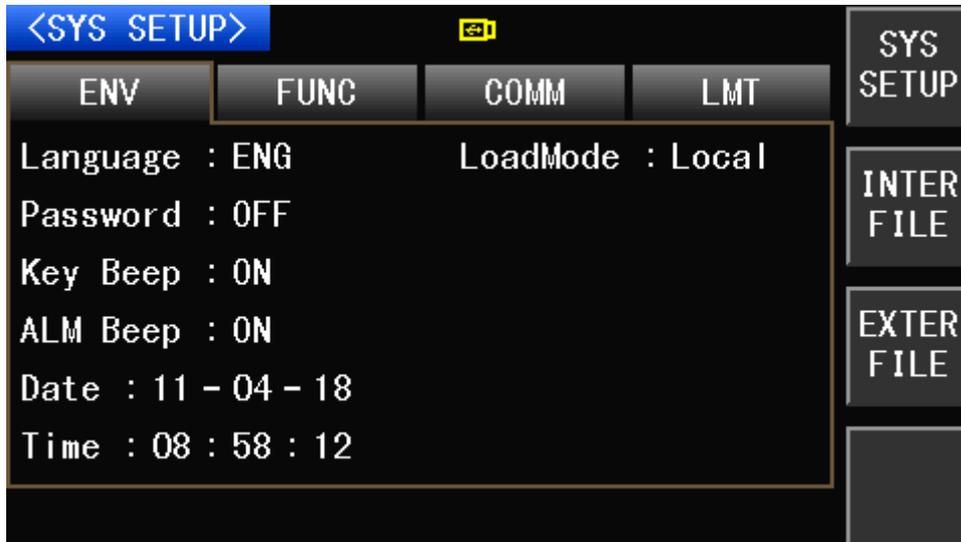
This parameter defines the duration of continuous output allowed when current limiting is active. Its range is 0 to 10 seconds. Setting it to 0 indicates immediate output shutdown when output current exceeds the current limit.

■ OCP Time

This parameter specifies the duration of continuous output allowed when output current exceeds the rated current. Its range is 1 to 3 seconds.

3.3 <System Setup>

3.3.1 Environment Setup



- System Language

This parameter sets the system language. Choose between English and Chinese modes.

- Password

This parameter sets the instrument password. Users can configure a password here. The device ships without a password. Once password protection is enabled, the password must be entered upon each power-on. Remember the password you set.

- Alarm Beep

This parameter determines whether an audible alarm sounds during abnormal conditions during testing.

- Key Beep

This parameter controls whether a key press sound is emitted when pressing front panel buttons.

- Date

This parameter sets the system date.

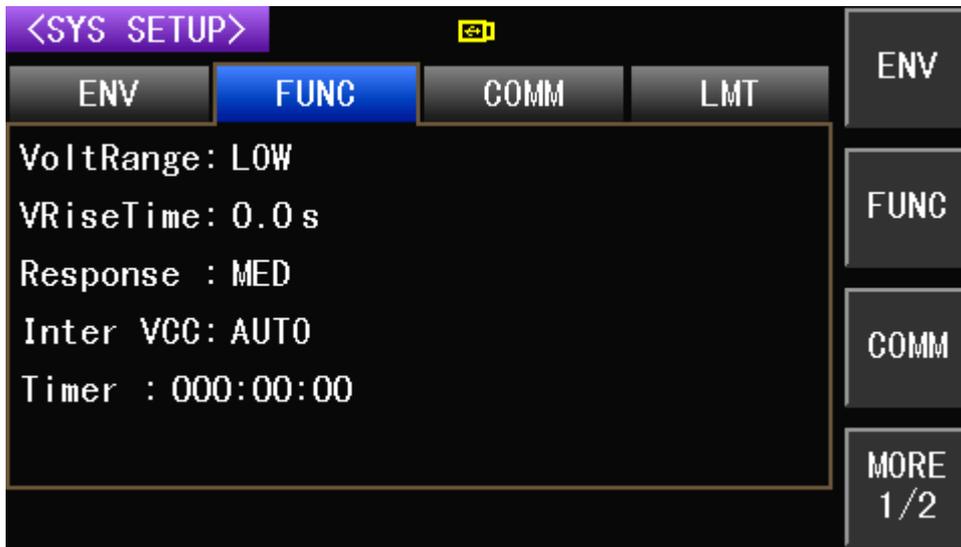
- Time

This parameter sets the system time.

- Load Mode

This parameter determines whether the instrument retains the previous parameter settings upon power-up. When set to "Local," it loads the settings from the last shutdown; when set to "Default," it restores to factory defaults.

3.3.2 FUNC Setup



■ Voltage Range

This parameter denotes the output voltage range, comprising low and high voltage settings. The high-voltage setting delivers twice the voltage of the low-voltage setting, while its current output is half that of the low-voltage setting. Voltage ranges may be switched when the output is deactivated.

■ VRise Time

This parameter governs the gradual rise of output voltage during startup to mitigate inrush current. Its adjustable range spans 0.0 to 3.0 seconds.

■ Response Speed

This parameter denotes the response speed of the internal amplifier. Three response speeds can be set: 'FAST', 'MED', and 'SLOW'.

The FAST response speed is suitable for research and development experiments requiring specific voltage rise/fall rates. If output instability occurs due to load conditions, use MED or SLOW response speed.

MED response speed is suitable for power supply environment testing under various frequency conditions, including commercial power supplies, marine power supplies, and aerospace equipment power supplies, such as low-frequency interference testing.

SLOW response speed provides stable power output and is appropriate for EMC test facility power supplies. It particularly ensures stable operation when large-capacity capacitors are connected to this instrument.

■ Internal VCC

This parameter sets whether the internal VCC voltage is fixed or automatically tracked. When internal VCC is fixed, the internal VCC voltage setting should ideally exceed the output voltage; otherwise, protection actions may be triggered.

■ Timer

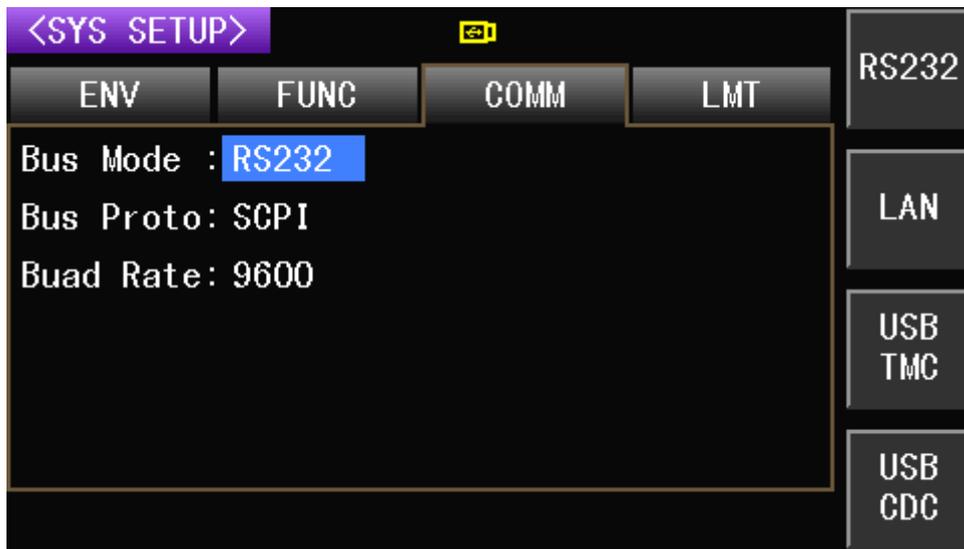
This parameter configures the output timing function. When a value is set, the system automatically shuts off the output upon reaching 000:00:00. If no value is set, the time of instrument output is displayed under the <Measurement Display> page.

3.3.3 COMM Setup

■ Communication Mode

This parameter configures the instrument's communication interface. Four modes are selectable: 'RS232', 'LAN', 'USB TMC', and 'USB CDC'. When set to 'RS232', communication is conducted via the rear panel RS232 port; when set to 'LAN', communication is conducted via the rear panel USB port (USB DEVICE); when set to 'USB TMC' or 'USB CDC', communication is conducted via the rear panel USB port.

3.3.3.1 RS232 Bus Mode



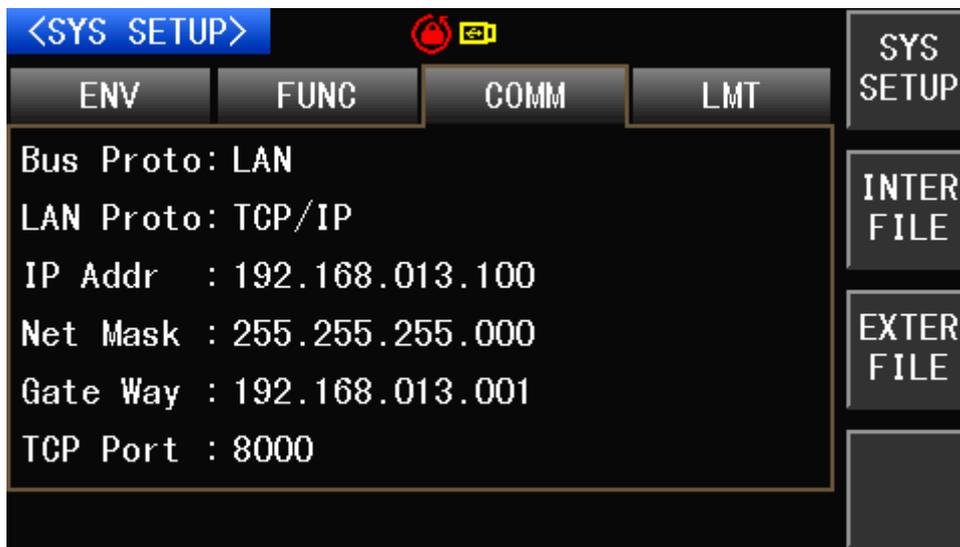
■ Communication Protocol

This parameter configures the protocol for the instrument's RS232 communication interface. It offers two selectable modes: 'SCPI' and 'MODBUS'.

■ Baud Rate

This parameter configures the baud rate for the instrument's RS232 interface. Eight baud rates are available: 4800, 9600, 14400, 19200, 38400, 57600, 96000, and 115200.

3.3.3.2 LAN Bus Mode



■ LAN Protocol

This parameter configures the network transmission protocol. It offers two modes: 'TCP/IP' and 'LXI'.

Selecting TCP/IP enables the instrument network to utilise the TCP/IP V4 communication protocol.

Selecting LXI enables the instrument network to utilise the LXI protocol, requiring the host computer to employ LabVIEW software. LXI represents a novel instrument platform based on industrial standards such as Ethernet technology, comprising small-to-medium-sized bus modules.

3.3.3.3 TCP Port

This parameter is used to configure the port number for the TCP/IP protocol. The port number range is 0 to 65535. TCP and UDP port number allocation can be divided into three ranges:

- 1) Well-known ports (0 to 1023): Managed by IANA and reserved for common TCP/IP applications.
- 2) Registered ports (1024–49151)
- 3) Dynamic or private ports (49152–65535): These ports are not managed by IANA and may be used by any organisation.

The complete port number allocation table is maintained by IANA and can be found at www.iana.org.

3.3.3.4 IP Address

Touch the corresponding area to bring up the numeric keypad on the screen for setting the IP address. The configurable range is 1 to 255.

3.3.3.5 Net Mask

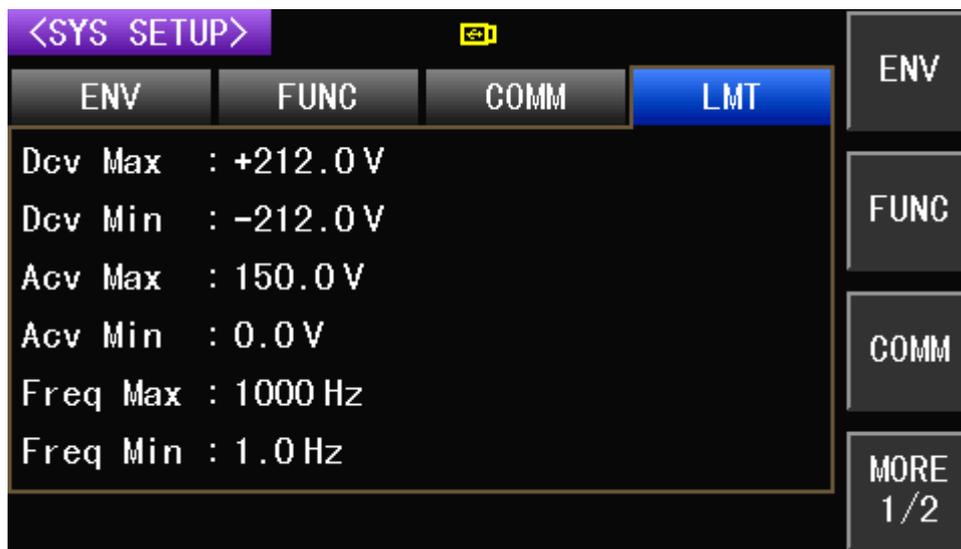
Touch the corresponding area to display the numeric keypad on the screen for configuring the subnet mask. The

configurable range is 1 to 255. The default setting is 255.255.255.000.

3.3.3.6 Gate Way

Touch the corresponding area to display the numeric keypad on the screen for configuring the default gateway. The configurable range is 1 to 255. The fourth byte of the gateway shall always be 001. The third byte of the gateway shall always match the third byte of the IP address.

3.3.4 Limit Setup



■ DCV Max

This parameter sets the upper limit for configurable DC voltage. Its range spans from the DCV Min to 212.0V (LOW) or from the DCV Min to 424.0V (HIGH).

■ DCV Min

This parameter sets the lower limit for configurable DC voltage. Its range is from -212.0V to the DCV Max (LOW) or from -412.0V to the DCV Max (HIGH).

■ ACV Max

This parameter sets the upper limit for configurable AC voltage. Its range is from the ACV Min to 150.0V (LOW) or from the ACV Min to 300.0V (HIGH).

■ ACV Min

This parameter sets the lower limit for configurable AC voltage. Its range is 0.0V to the ACV Max value.

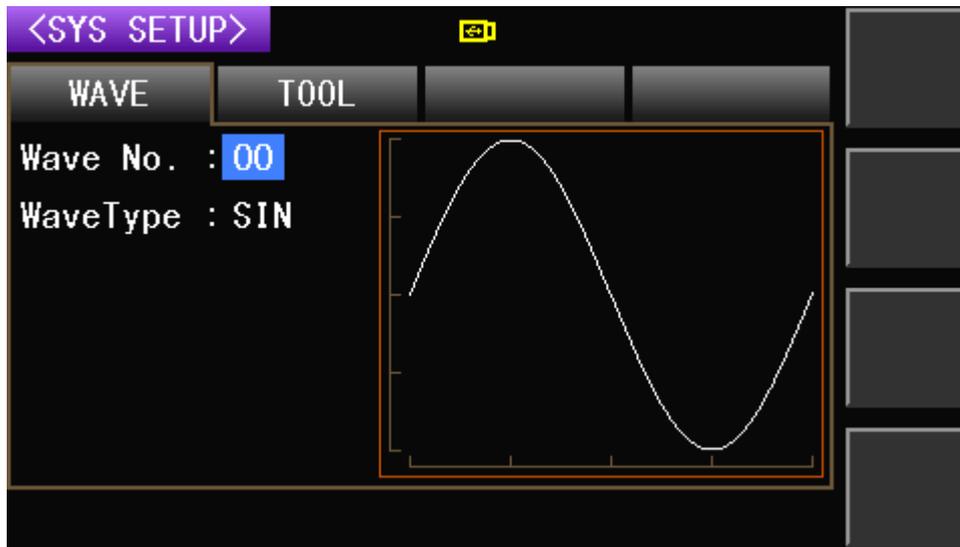
■ Frequency Max

This parameter sets the upper limit for configurable output frequency. Its range is the Frequency Min value to 1000Hz.

■ Frequency Min

This parameter sets the lower limit for configurable output frequency. Its range is 1.0Hz to the Frequency Max value.

3.3.5 WAVE Setup



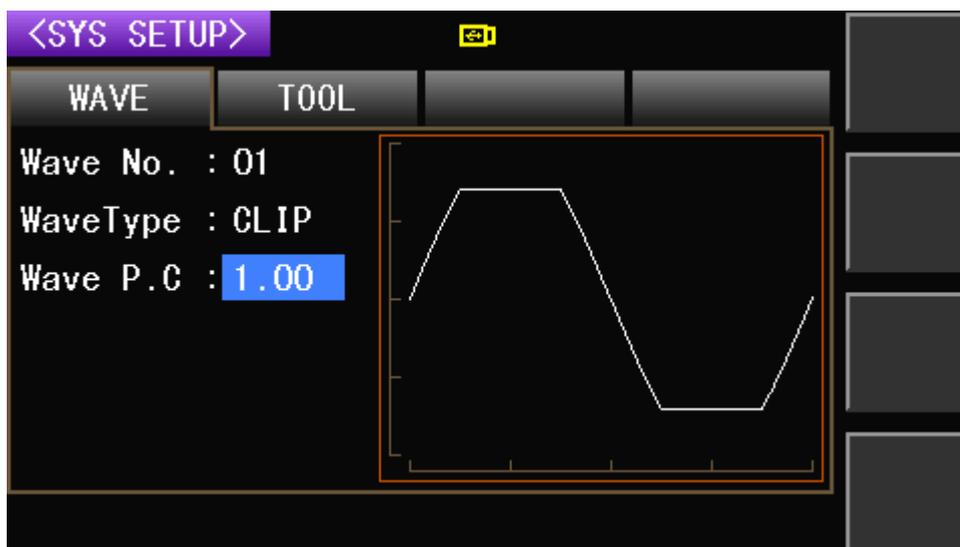
- Waveform No.

Its range is 0 to 63. Waveform library number 0 stores sine waveform data, and its waveform type cannot be altered. Upon leaving the factory, all waveform libraries in this instrument contain sine waveform data.

- Waveform Type

This parameter sets the waveform type. Options include 'SIN', 'CUT', 'SQUARE', 'TRI', 'S/T', and 'DIMMER'.

3.3.5.1 CLIP



- Wave P.C

This parameter sets the crest factor of the clipped waveform. Its range is 1.2 to 1.4. Crest factor = peak value / RMS value. For a sine wave, the crest factor equals 1.41.

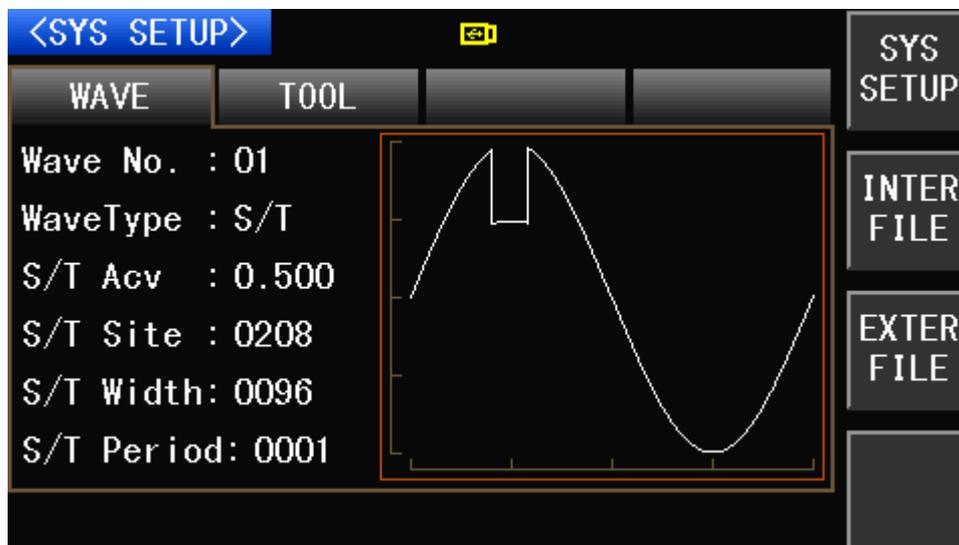
3.3.5.2 SQUARE

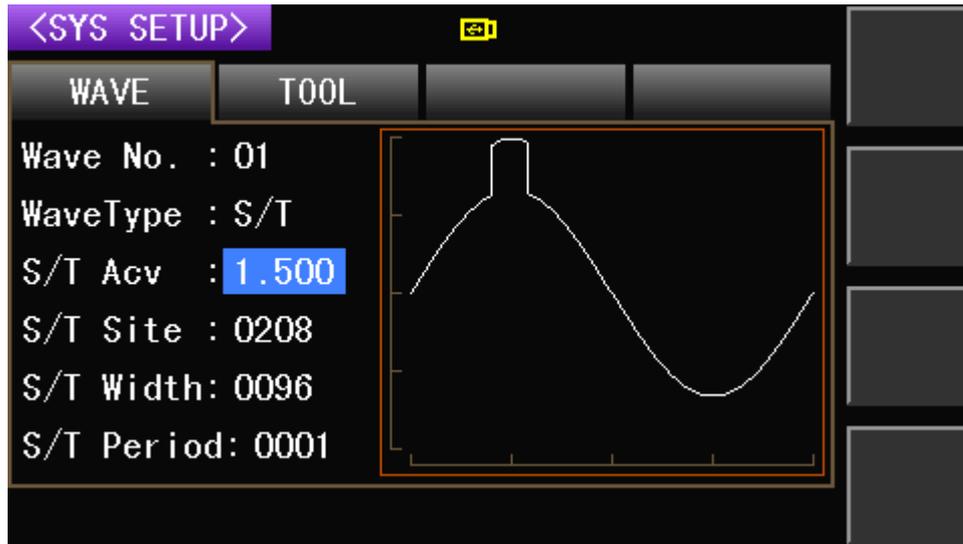


- Wave Duty

This parameter sets the duty cycle of the square waveform. Its range is 1.0% to 99.9%.

3.3.5.3 S/T





■ S/T Voltage

This parameter is multiplied by the AC voltage to represent the surge/trap voltage. Its range is 0.001 to 999.9.

When <value> is less than or equal to 1, the waveform is set as a trap, and the trap voltage equals the AC voltage parameter from the <Basic Setup> Basic Page, or the AC voltage parameter from the <Step Setup> Basic Page, or the AC voltage parameter from the <SIM Setup> Basic Page multiplied by <value>.

When <value> is greater than 1, the waveform is set as a surge. The surge voltage equals the AC voltage parameter from the <Basic Setup> Basic Page, or the AC voltage parameter from the <Step Setup> Basic Page, or the AC voltage parameter from the <SIM Setup> Basic Page. The output voltage equals the surge voltage multiplied by the reciprocal of <value>.

■ S/T Site

Points from 0 to 1023 represent one period. Point 256 indicates 90° of one period, while 512 indicates 180° of one period. The S/T site ranges from 0 to (1023 – S/T Width).

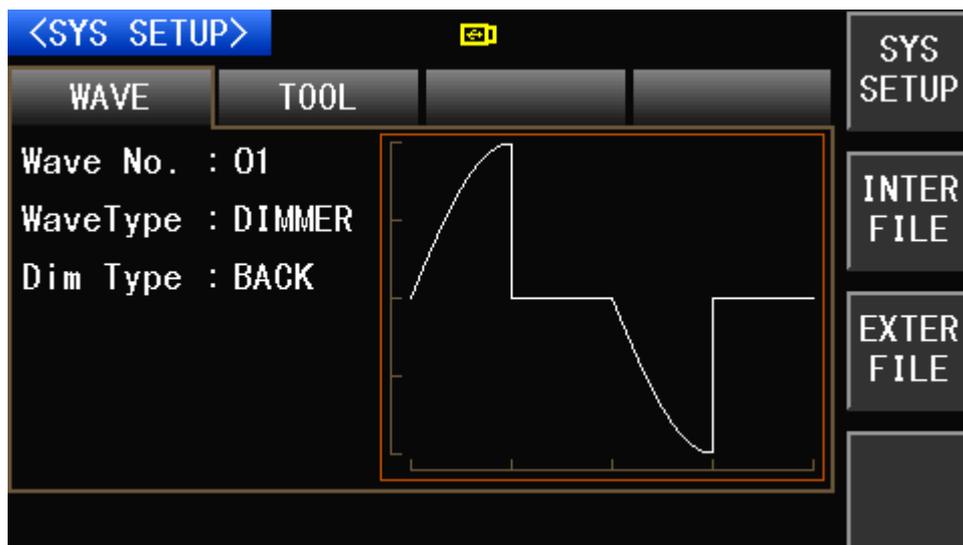
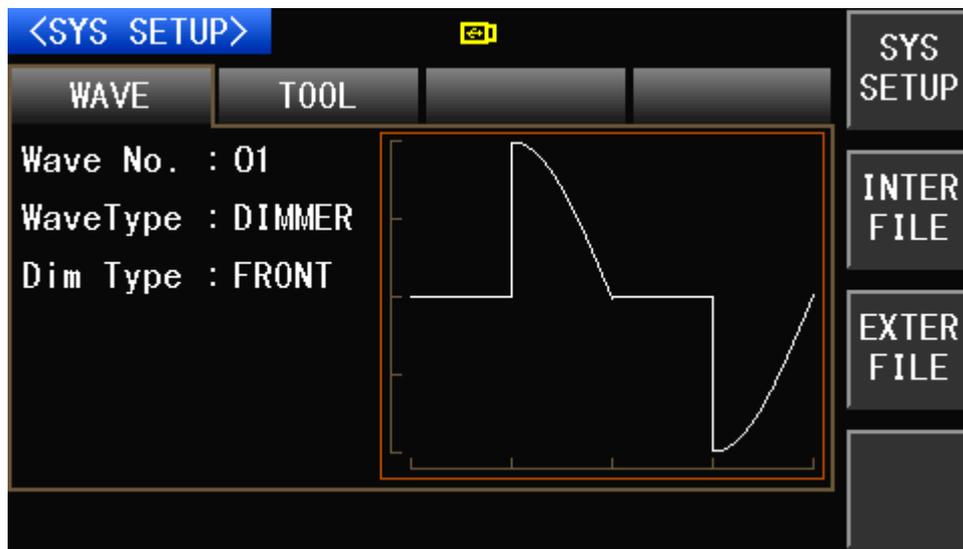
■ S/T Width

The S/T width ranges from 0 to (1023 – S/T Site).

■ S/T Period

This parameter indicates the number of periods between S/T. Its range is 1 to 9999.

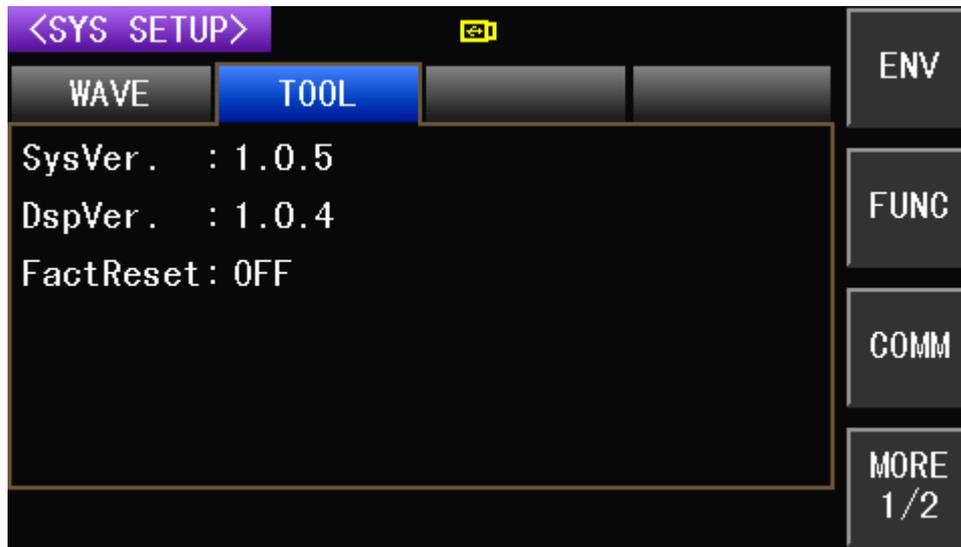
3.3.5.4 DIMMER



■ Dim Type

This parameter sets the type of dimming waveform. Options include “FRONT” and “BACK”.

3.3.6 System Tool



- System Version

This parameter displays the CPU's system version. The CPU may be upgraded by pressing the soft key labelled "CPU Upgrade".

- DSP Version

This parameter displays the DSP's system version. The DSP may be upgraded by pressing the soft key labelled "DSP Upgrade".

- Factory Reset

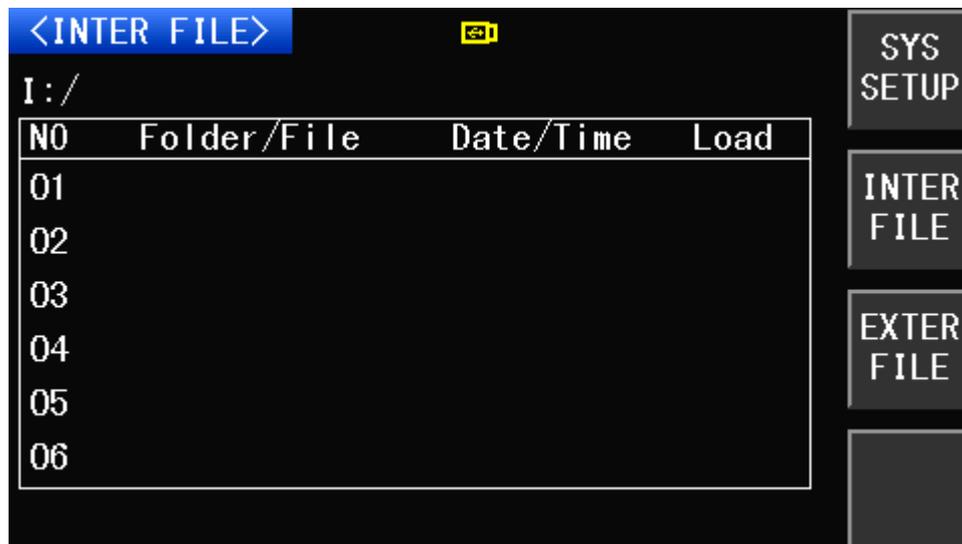
Restores the instrument to its factory default settings. Confirming this action requires restarting the instrument.

Chapter 4 File Management

4.1 Internal File

4.1.1 Description

The TH7200 series programmable AC power supply can store all the parameters that set by the user into the internal non-volatile memory in the form of a file. When users need to use the same settings the next time, users do not need to reset the parameters, just load the corresponding file, you can get the same settings as last time. “I” is the short for **Internal**, which stands for the internal non-volatile memory. As shown below.



4.1.2 Operation

Press the **SYSTEM** button, then press **INTER FILE** soft key to enter <InterFile> interface. This instrument can operate on 54 internal files. When the cursor is not in the title bar, press **←** key or **→** key to quickly return to the title bar.

■ Save

- 1) Move the **←** key to the serial number of the empty file, then press the **save** button.
- 2) A character selection panel will pop up in the center of the screen, move the cursor to your desired place with **←**, **→**, **↑**, **↓** keys or the **knob**, then press **ADD CHAR** soft key to add characters to the file name in the prompt bar at the bottom of the screen. If you enter the wrong character, press the **BACK SPACE** soft key. If you do not need to save the file at this time, press **EXIT** button.

3) After the file name is entered, press **ENTER** or **OK** to save the file. If the entered file name is the same as the previous file name, a prompt will appear in the prompt bar at the bottom of the screen. If a user did not enter a file name, and pressed **ENTER** or **OK**, the default file name is UNNAMExx. STA (Note: xx represents the current file serial number).

■ Load

- 1) Press **□** button to move the cursor to the file number to be loaded.
- 2) Press the **Load** key to load the file where the cursor is located.

■ Copy to E:

- 1) Press **□** button to move the cursor to the file number to be copied.
- 2) Press the **Copy to E:** soft key to copy the file where the cursor is located to the U disk. If no U disk is plugged in the instrument, an error shall be prompt. In order to operate correctly, please insert a U disk into the front panel USB interface before copy the file.

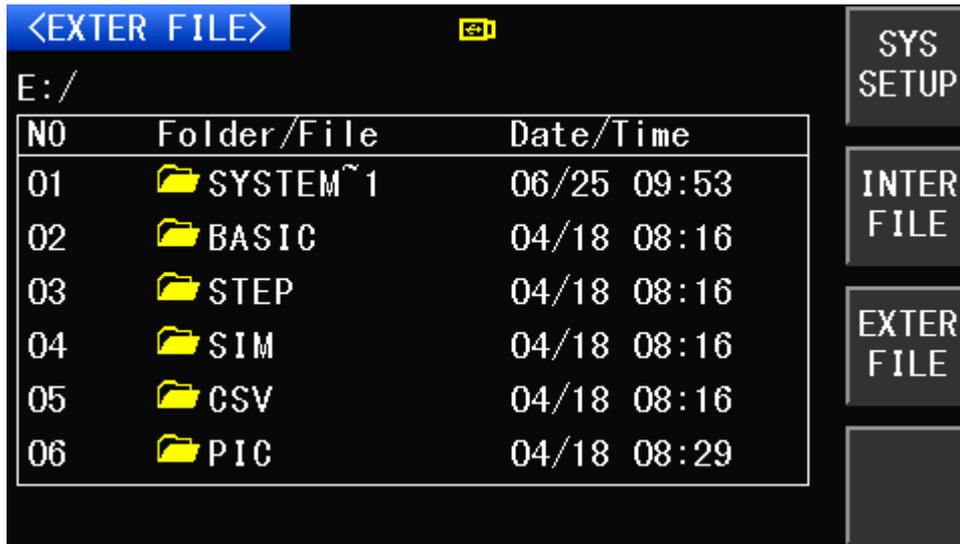
■ Delete

- 1) Press **□** button to move the cursor to the file number to be deleted.
- 2) Press the **DEL.** key to delete the file where the cursor is located.

4.2 External File

4.2.1 Description

The TH7200 series programmable AC power supply can store all the parameters that set by the user into the external memory in the form of a file, such as a U disk. When users need to use the same settings the next time, users do not need to reset the parameters, just load the corresponding file, you can get the same settings as last time. “E” is the short for **External**, which stands for the external memory. As shown below.



The following points should be noted when using a U disk on TH7200 series programmable AC power supply:

- 1) Use a U disk with USB 2.0 interface.
- 2) The U disk file system should be FAT16 or FAT32, and formatted using the FAT16 or FAT32 standard; For U disk over 512M, users are advised to use FAT32 standard for formatting.
- 3) Before connecting the U disk to the TH7100 series instrument, it is recommended to back up the data on this U disk. Tonghui Company is not responsible for data loss in the USB disk when the USB disk is used with this instrument.

In order to efficiently save the instrument data to the USB flash drive, it is recommended not to have too many files or folders in the USB flash drive.

The file format and its use are described in the following table:

Type	Format	Callable	Use
Setting Saving(I U disk)	*.STA	yes	Save the instrument's parameter settings to the internal FLASH.
Setting Saving (E U disk)	*.STA	yes	Save the instrument's parameter settings to U disk
Data Saving (E U disk)	*.CSV	no	Save the test results to U disk

Table 4-1 U disk file type description

4.2.2 Operation

Press the **SYSTEM** key, then press **external file** key to enter the <external file> interface. The instrument can operate on 54 external files. When the cursor is not in the title bar, press the **ESC** key or **HOME** key to quickly return to the title bar.

■ Save

- 1) Move the  key to the serial number of the empty file, then press the **save** button.
- 2) A character selection panel will pop up in the center of the screen, move the cursor to your desired place with , , ,  keys or the **knob**, then press **ADD CHAR** soft key to add characters to the file name in the prompt bar at the bottom of the screen. If you enter the wrong character, press the **BACK SPACE** soft key. If you do not need to save the file at this time, press **EXIT** button.
- 3) After the file name is entered, press **ENTER** or **OK** to save the file. If the entered file name is the same as the previous file name, a prompt will appear in the prompt bar at the bottom of the screen. If a user did not enter a file name, and pressed **ENTER** or **OK**, the default file name is UNNAMExx.STA (Note: xx represents the current file serial number).

■ Load

- 1) Press  button to move the cursor to the file number to be loaded.
- 2) Press the **Load** key to load the file where the cursor is located.

■ Copy to I:

- 1) Press  button to move the cursor to the file number to be copied.
- 2) Press the **Copy to I:** soft key to copy the file where the cursor is located to the internal FLASH

■ Delete

- 1) Press  button to move the cursor to the file number to be deleted.
- 2) Press the **DEL.** key to delete the file where the cursor is located.

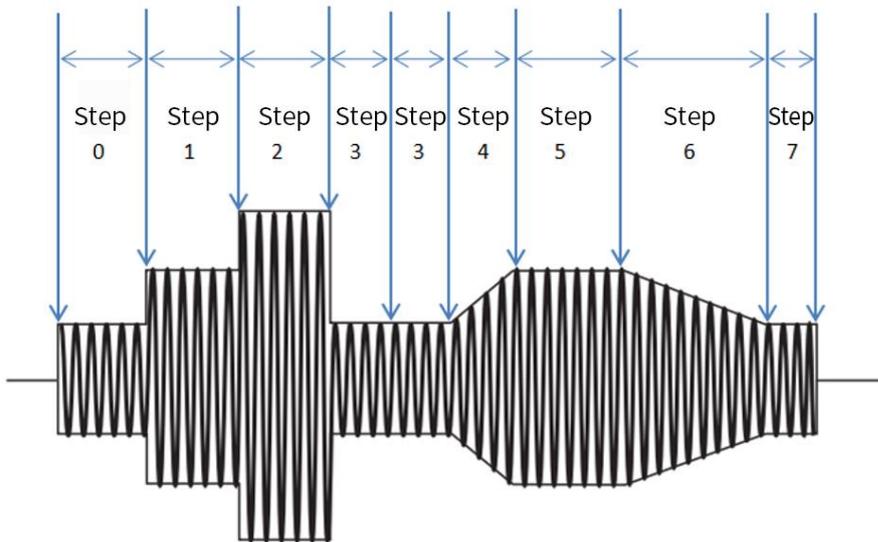
Chapter 5 Advanced Function Introduction

5.1 STEP Operation Function

5.1.1 Overview

Step operations constitute action functions that achieve automated operation by sequentially invoking pre-set combinations of output voltage, frequency, time, and other parameters. A step operation is an aggregate of actions organised by step. Upon initiation (by pressing the ON/OFF key), the operation executes sequentially from the specified starting step number, advancing one step at a time until reaching the final designated step, thereby completing one full execution of the step operation.

5.1.2 Example



Set the initial step of the <Step Setup>∇ General Page to 000 and the final step to 007. The parameter settings for each step are as shown in the table below:

	Step 0	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
DC Volt	0.0V							
AC Volt	50.0V	100.0V	150.0V	50.0V	100.0V	100.0V	50.0V	50.0V
Freq	50.00Hz							
On Phase	000 °							
Off Phase	000 °							
Time	000:00:00 .180	000:00:00 .180	000:00:00 .180	000:00:00 .080	000:00:00 .080	000:00:00 .140	000:00:00 .200	000:00:00 .080
Step Cont	1	1	1	2	1	1	1	1

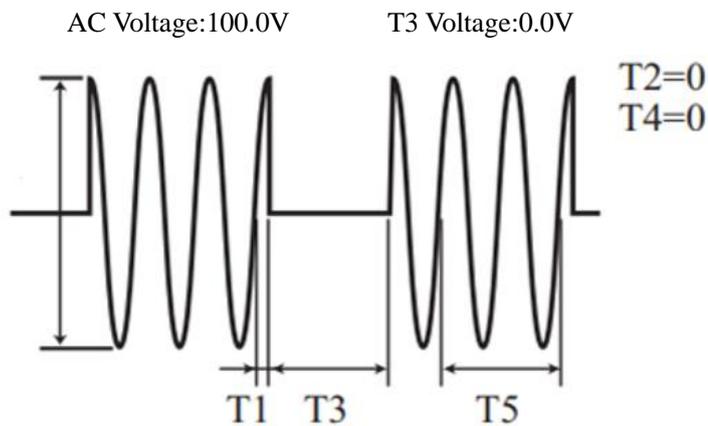
DCV Ramp	OFF							
ACV Ramp	OFF	OFF	OFF	OFF	ON	OFF	ON	OFF
Wave No.	0	0	0	0	0	0	0	0
Output	ON							
Phase Vary	OFF							
Freq Ramp	OFF							

5.2 Power Abnormality Simulation Function (SIM)

5.2.1 Overview

The power supply anomaly simulation mode can only output AC waveforms, enabling the generation of abnormal outputs such as power outages, voltage surges, and voltage dips. This functionality facilitates testing of switching power supplies and electronic equipment.

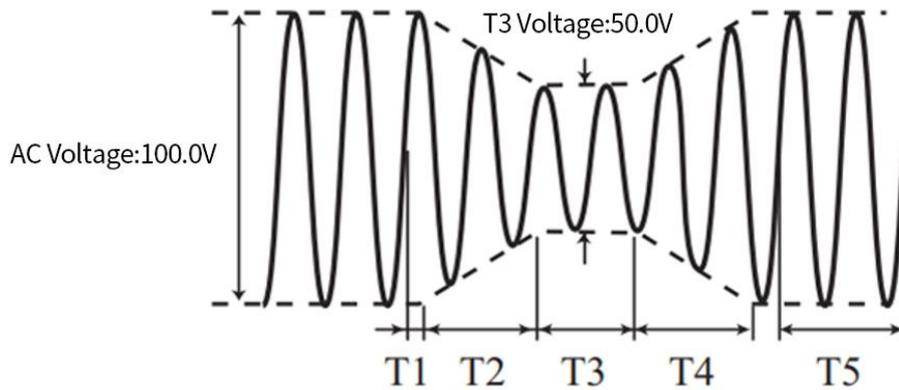
5.2.2 Power Failure Example



AC Voltage	100.0V
Freq	50.00Hz
T1 Time	5.0ms
T2 Time	00000ms
T3 Time	40.0ms
T4 Time	00000ms
T5 Time	0040ms
T3 Voltage	0.0V

Loop Cycle	1
On Phase	090 °
Off Phase	090 °

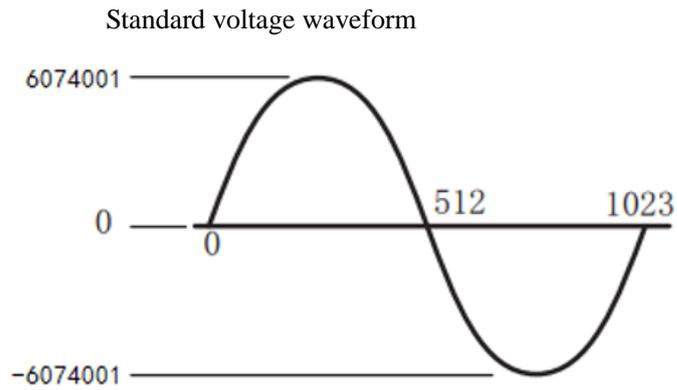
5.2.3 Example of Voltage Rise and Fall



AC Voltage	100.0V
Freq	50.00Hz
T1 Time	5.0ms
T2 Time	00040ms
T3 Time	40.0ms
T4 Time	00040ms
T5 Time	0040ms
T3 Voltage	50.0V
Loop Cycle	1
On Phase	000 °
Off Phase	000 °

5.3 Output Special Waveforms (Waveform Library)

This product utilises output voltage waveform data stored within its internal memory. This data undergoes digital-to-analogue conversion to generate the reference waveform for the output voltage. The product is capable of producing built-in waveforms including sine waves, square waves, triangle waves, surge-trap waves, and dimming waves.

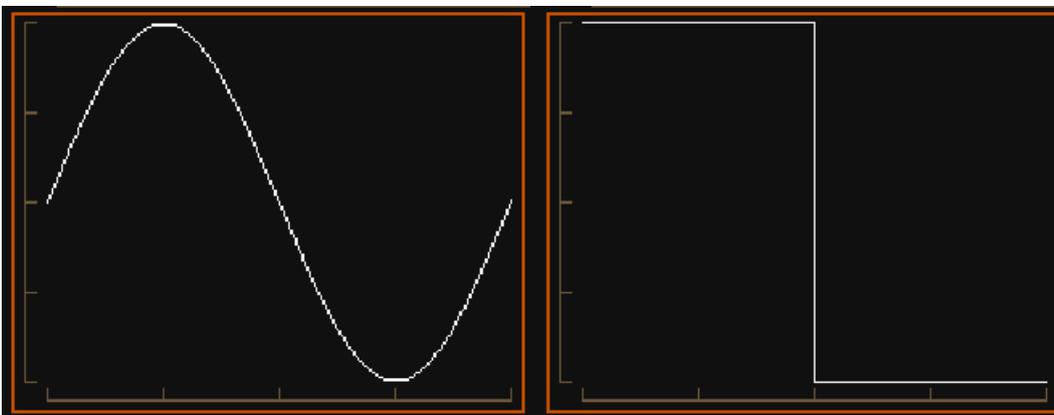


The sine waveform is calculated using the following formula:

$$V_{\text{dot}} = \frac{2^{30} * \sqrt{2} * \sin\left(\frac{2 * \pi * \text{dot}}{1024}\right)}{250}$$

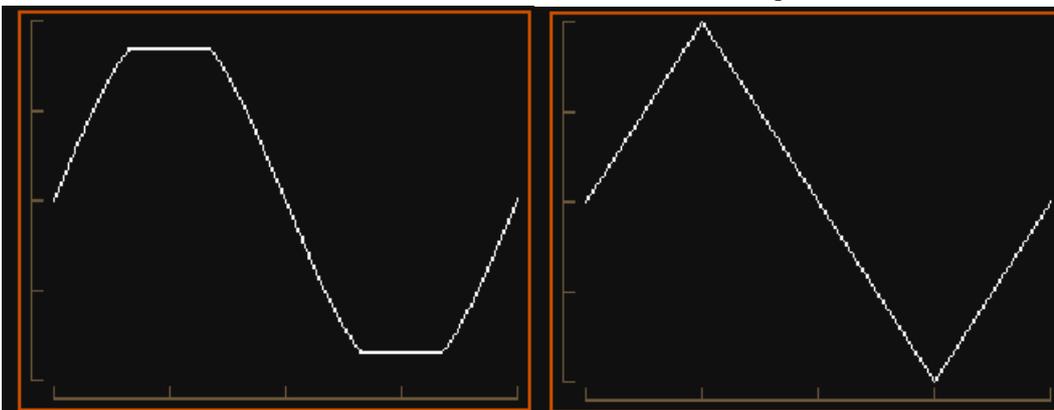
Where dot denotes a positive integer ranging from 0 to 1023, representing the position point of the waveform. Vdot is rounded to the nearest integer.

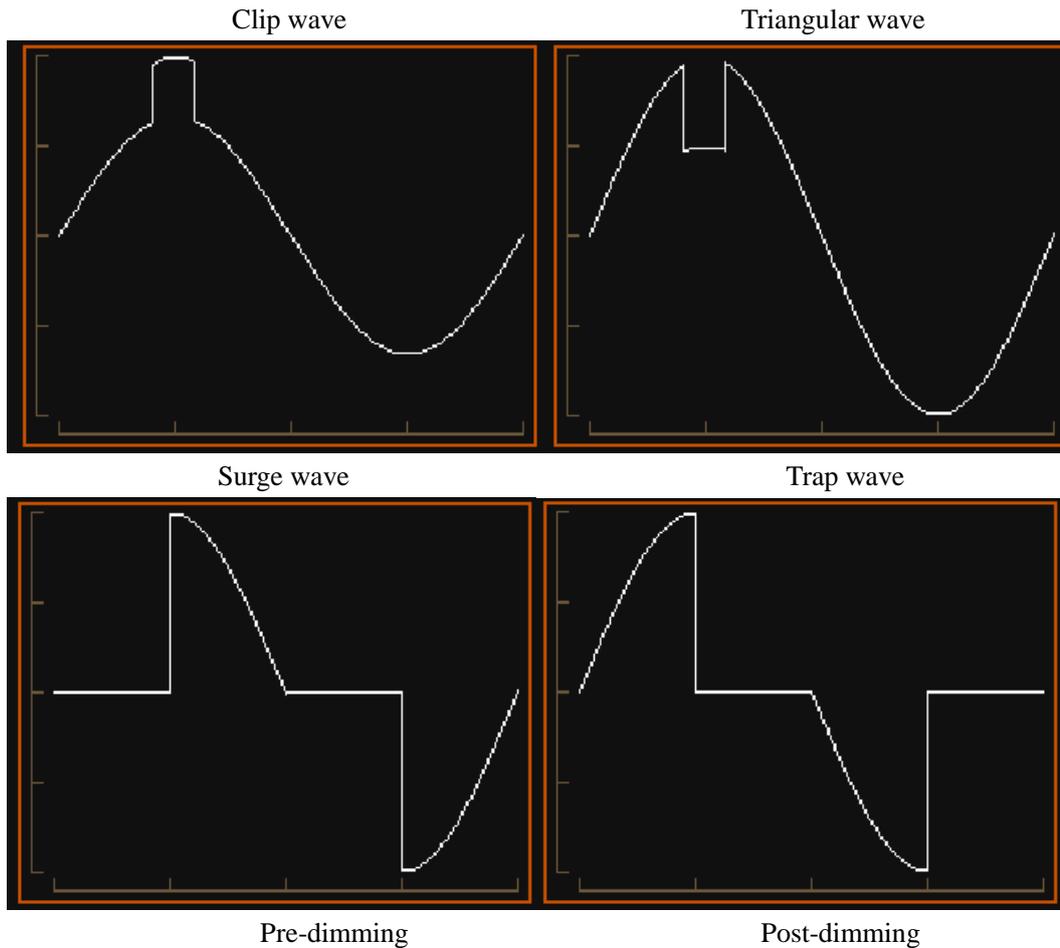
5.3.1 Built-in waveforms



Sine wave

Square wave





5.3.2 Custom Waveforms

$$V_{\text{dot}} = \frac{2^{30} * \sqrt{2} * \sin\left(\frac{2 * \pi * \text{dot}}{1024}\right)}{250}$$

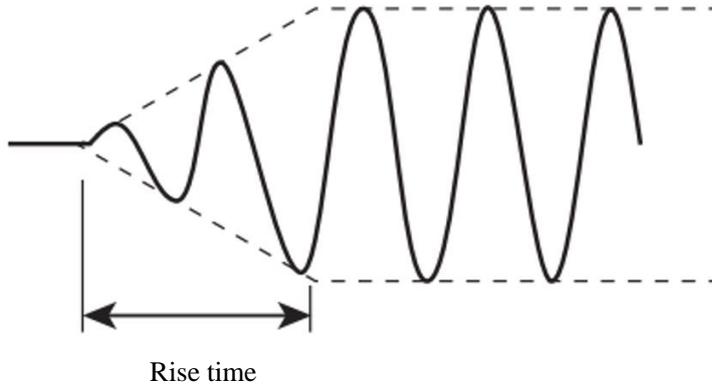
Users may employ software such as MATLAB to simulate required waveforms based on the above formula. Select any 1024 integer values within the range -6074001 to 6074001 to obtain 1024 data points. Save these points in CSV file format to a USB drive. Subsequently, load the CSV file into the internal waveform library.

5.4 Soft Start Function

5.4.1 Overview

To prevent output OFF and voltage drops caused by inrush currents from load devices exceeding the rated capacity of this product, the output voltage can be gradually increased during output ON to suppress inrush currents.

5.4.2 Use example



In the <System Setup>∇ Function Setup page, configure the voltage rise setting value to enable the soft start function. The prompt area on the measurement display interface will show “RISE”.

Note: When the soft start function is enabled, the On Phase setting is invalid.

5.5 Response

5.5.1 Overview

This product can adjust the response speed of its internal amplifier based on load conditions and application, offering the following three response speeds:

- High-Speed Response (FAST)

High-speed response is used for R&D experiments requiring specific power supply rise/fall rates. Due to load conditions, output instability may occur. If instability occurs, use MED or SLOW response speed.

- Medium Response (MED)

Medium response is suitable for applications including low-frequency interference testing.

- Low Response (SLOW)

Low response provides stable power output, making it ideal for loads such as power supplies in EMC testing. Notably, it ensures stable output operation when large-capacity capacitors are connected to the product's output.

5.6 Inter VCC

5.6.1 Overview

To minimize linear amplifier losses, this product automatically adjusts its internal VCC voltage. While fixing the VCC voltage would reduce output voltage variation time, it would increase internal power dissipation. When the internal VCC is fixed, increased internal power loss may trigger protection actions due to variations in output voltage, load conditions, or ambient temperature. Verify these factors before testing.

Chapter 6 Performance and Metrics

6.1 Input

Model	TH7205	TH7210
Voltage	100~120Vac, 200~240Vac	
Frequency	50~60Hz	
Maximum Current	11.3A, 5.5A	22.0A, 10.8A
Power factor	0.7	

6.2 AC mode output

Model		TH7205	TH7210
Output Voltage	Range	LOW	1.0~150.0V
		HIGH	2.0~300.0V
	Resolution		0.1V
	Accuracy		$\pm(0.3\%+0.6V$ of the set voltage)
Output frequency	Range		1Hz~1000Hz
	Accuracy		0.01Hz(1.00~99.99Hz) 0.1Hz(100.0~999.9Hz)
Maximum Current (RMS)	LOW	5.0A	10.0A
	HIGH	2.5A	5.0A
Maximum Current (Peak)		Maximum Current (RMS)X4(TYP)	
Rated Power		500VA	1000VA
Power factor		0~1	

6.3 DC mode output

Model		TH7205	TH7210
Output Voltage	Range	LOW	1.4~212.0V
		HIGH	2.8~424.0V
	Resolution		0.1V
	Accuracy	LOW	$\pm(0.05\%+0.05V$ of the set voltage)
HIGH		$\pm(0.05\%+0.1V$ of the set voltage)	
Maximum Current (RMS)	LOW	3.5A	7.0A
	HIGH	1.75A	3.5A
Maximum Current (Peak)		Maximum Current (RMS)X3.6 (TYP)	

Rated Power	350W	700W
Ripple noise	<=0.15Vrms	

6.4 Output

Model		TH7205	TH7210
Linear Regulation Rate		±0.1%	
Load Regulation	LOW	±0.1V	
	HIGH	±0.2V	
Total Harmonic Distortion (THD)		0.2% or less	
Response time		30us(TYP)	
Energy efficiency		55% or More	

6.5 Setup

Model		AC	DC	AC+DC	
Voltage	Range	LOW	0~150.0V	±(1.4~212.0V)	AC: 0~150.0V DC: ±(1.4~212.0V)*1
		HIGH	0~300.0V	±(2.8~424.0V)	AC: 0~300.0V DC: ±(2.8~424.0V)*1
	Resolution	0.1V			
FREQ	Range	1Hz~1000Hz			
	Resolution	0.01Hz (1.00Hz~99.99Hz); 0.1Hz (100.0Hz~999.9Hz)			
On/off	Range	0~359°			
Phase	Resolution	1°			

*1. In AC+DC mode, the LOW voltage setting satisfies $\sqrt{2} \times V_{ac} + |V_{dc}| \leq 212$;
the HIGH voltage setting satisfies $\sqrt{2} \times V_{ac} + |V_{dc}| \leq 424$.

6.6 Measurement

Model		TH7205	TH7210	
Voltage	Range	0~300Vac, -424~424Vdc		
	Resolution	0.1V		
	Accuracy	±(1% of the reading + 2 digits)		
FREQ	Range	1Hz~1000Hz		
	Resolution	0.01Hz(1.0Hz~99.99Hz); 0.1Hz(100Hz~999.9Hz)		
Curent	Range	LOW	0.00~5.00A	0.00~10.00A
		HIGH	0.00~2.50A	0.00~5.00A

	Resolution	0.01A	
		$\pm(1\% \text{ of the reading} + 2 \text{ digits})$	
Peak current	Range	AC Mode	Maximum current (RMS)X4 (TYP)
		DC Mode	Maximum current (RMS)X3.6 (TYP)
	Resolution	0.01A	
	Accuracy	$\pm(5\% \text{ of the reading} + 2 \text{ digits})$	
Power	Range	0~500W	0~1000W
	Resolution	0.1W(0~1000W)	
	Accuracy	$\pm(1\% \text{ of the reading} + 3 \text{ digits})$	
Power factor	Resolution	0.001	
	Accuracy	Calculate and display to three significant digits	

Chapter 7 Remote Control

7.1 RS232 Interface

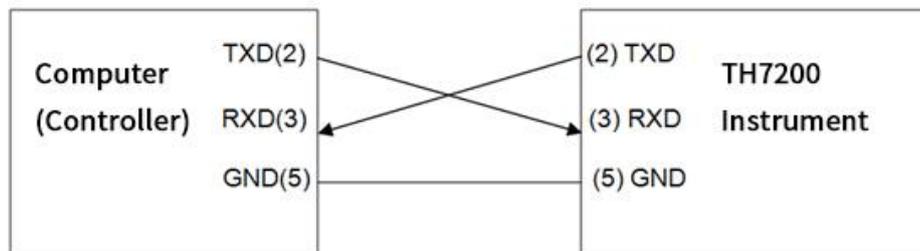
The widely adopted serial communication standard is RS-232, also known as the asynchronous serial communication standard. RS stands for “Recommended Standard,” and 232 denotes the standard number. This standard was formally published by the Institute of Electrical and Electronics Engineers (IEEE) in 1969, specifying the transmission of one bit at a time over a single data line.

Like most serial ports worldwide, this instrument's serial interface does not strictly adhere to the RS-232 standard but provides only a minimal subset. As shown in the table below:

Signal	Symbol	Connector Pin#
Transmit Data	TXD	2
Receive Data	RXD	3
Grounding	GND	5

The reason is that operating three lines is significantly cheaper than operating five or six lines, which is the greatest advantage of using serial port communication.

The instrument connects to the computer as shown in the figure below:



As shown in the diagram, the pin definitions for the instrument's connectors differ from those of the 9-pin serial interface connectors used by computers. Users can purchase serial interface cables connecting computers to Tonghui instruments from Changzhou Tonghui Electronics Co., Ltd.

The RS232 interface baud rate can be selected from 9600 to 115200, with no parity, 8 data bits, and 1 stop bit.

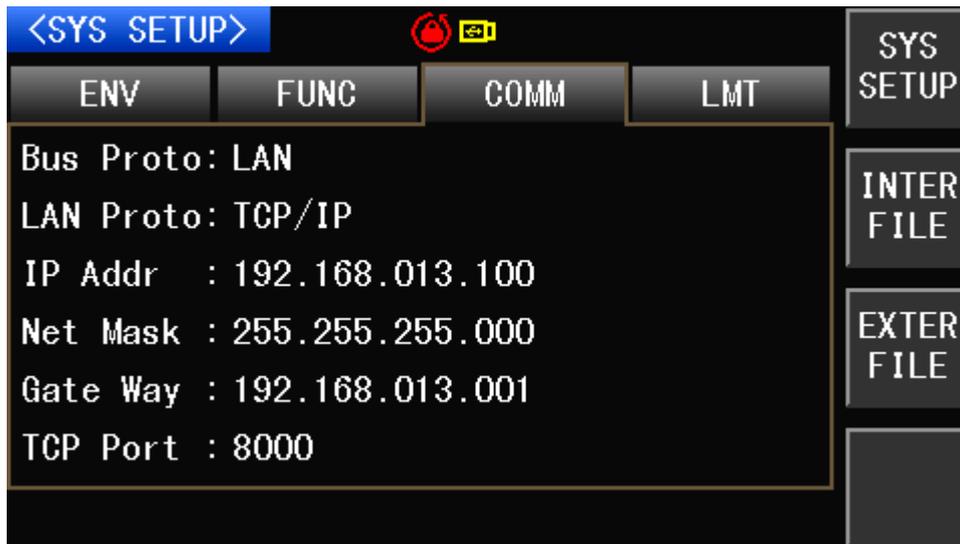
Instrument commands comply with the SCPI standard. After sending a command string to the instrument, an LF (hexadecimal: 0AH) must be transmitted as the terminating character. The instrument can receive up to 2KB of SCPI command string bytes in a single transmission.

For details on the format of result data sent by the instrument to the computer, refer to the Command Reference section.

7.2 LAN Remote Control System

Press the SYSTEM key, then move the cursor to Environment Setup. Press **F1** to move the cursor to Communication

Setup. The network parameter settings for the TH7200 series instruments are shown in the figure below:



7.2.1 LAN Protocol

When the cursor moves to the LAN Proto area, the softkey area on the screen displays:

- TCP/IP

Select TCP/IP for the instrument network to use the TCP/IP V4 communication protocol.

- LXI

Select LXI for the instrument network to use the LXI protocol; the host computer requires LabVIEW software. LXI is a new instrument platform based on industrial standards such as Ethernet technology, composed of small and medium-sized bus modules.

7.2.2 TCP Port

Move the cursor to the TCP Port field and use the numeric keypad to enter a value. Port numbers range from 0 to 65535.

TCP and UDP port number allocation is divided into three ranges:

- 1) Well-known ports (0–1023): Managed by IANA and reserved for common TCP/IP applications.
- 2) Registered ports (1024–49151)
- 3) Dynamic or private ports (49152–65535): These ports are not managed by IANA and may be used by any organization.

The complete port number allocation table is maintained by IANA and can be found at www.iana.org.

7.2.3 IP Address

Move the cursor to the IP address field and use the numeric keypad to set the IP address within the range of 1 to 255.

7.2.4 Net Mask

Move the cursor to the Net Mask field. Use the numeric keypad to set the subnet mask within the range of 1 to 255. The default setting is 255.255.255.000.

7.2.5 Gate Way

Move the cursor to the Gate Way. Use the numeric keypad to configure the gateway settings within the range of 1 to 255. The fourth byte of the gateway address is always 001. The third byte of the gateway address is always identical to the third byte of the IP address.

7.3 USBTMC Remote Control System

The USB (Universal Serial Bus) remote control system operates devices via the USB interface. This connection complies with the USBTMC-USB488 and USB 2.0 protocols.

7.3.1 System Configuration

Connect the USB port on the rear panel of the TH7200 to the USB port on the host computer using a USB cable.

7.3.2 Driver Installation

When connecting the TH7200 to the computer via USB cable for the first time, the computer will display a notification in the lower-right corner of the desktop stating: “New hardware found.” Immediately afterward, a dialog box will appear prompting you to install the driver.

Click “Next,” and the dialog box. Select “Automatically install software (recommended).”

After installing the driver, users can see “USB Test and Measurement Device” in their computer's Device Manager. Users can access the instrument via LabVIEW programming when using the USBTMC interface.

7.4 USB CDC Virtual Serial Port

By selecting the bus type “USB CDC”, the USB interface can be configured as a virtual serial port.

7.4.1 System Configuration

Connect the USB port on the rear panel of the TH7200 to the USB port on the host computer using a USB cable.

7.4.2 Driver Installation

Download the TH7200 USB VCOM driver from the TH7200 section under Software in the Download Center, accessible via Service & Support on the Tonghui Electronics official website.

After installing the driver, users can locate “USB VCOM PORT” in their computer's Device Manager.

At this point, the USB VCOM port functions as a serial port. When a PC lacks a physical serial port, serial-based communication software can utilize this mode to treat the USB port as a virtual serial port for operation.