User Manual

N3410 Series Triple-channel Programmable DC Power Supply

Version: V20231201

Contents

1 Preface

Dear Customers,

First of all, we greatly appreciate your choice of N3410 series programmable DC power supply (N3410 for short). We are also honored to introduce our company, Hunan Next Generation Instrumental T&C Tech. Co., Ltd.

About Company

TOYOTECH is a professional manufacturer of intelligent equipment and test & control instruments, committed to developing, manufacturing battery simulators, power supplies, electronic loads, and many more instruments. The products can be widely used in the industries of battery, power supply, fuel cell, consumer electronics, new energy vehicle, semiconductor, etc.

TOYOTECH maintains close cooperation with many universities and scientific research institutions, and maintains close ties with many industry leaders. We strive to develop high- quality, technology- leading products, provide high- end technologies, and continue to explore new industry measurement and control solutions.

About User Manual

This manual is applied to N3410 series programmable DC power supply, including installation, operation, specifications and other detailed information. The copyright of the manual is owned by TOYOTECH. Due to the upgrade of instrument, this manual may be revised without notice in future versions.

This manual has been reviewed carefully by TOYOTECH for the technical accuracy. The manufacturer declines all responsibility for possible errors in this operation manual, if due to misprints or errors in copying.The manufacturer is not liable for malfunctioning if the product has not correctly been operated.

To ensure the safety and correct use of N3410, please read this manual carefully, especially the safety instructions.

Please keep this manual for future use.

Thanks for your trust and support.

2 Safety Instructions

In the operation and maintenance of the instrument, please strictly comply with the following safety instructions. Any performance regardless of attentions or specific warnings in other chapters of the manual may impair the protective functions provided by the instrument.
TOYOTECH shall not be liable for the results caused by the neglect of those instructions.

2.1 Safety Notes

- **Confirm the AC input voltage before supplying power**.
- **Reliable grounding**: Before operation, the instrument must be reliably grounded to avoid the electric shock.
- **Confirm the fuse**: Ensure to have installed the fuse correctly.
- **Do not open the chassis**: The operator cannot open the instrument chassis. Non-professional operators are not allowed to maintain or adjust it.
- **Do not operate under hazardous conditions**: Do not operate the instrument under flammable or explosive conditions.
- **Confirm the working range**: Make sure the DUT is within N3410's rated range.

2.2 Safety Symbols

Please refer to the following table for definitions of international symbols used on the instrument or in the user manual.

Table 1

Symbol	Definition	Symbol	Definition
⎓	DC (direct current)	N	Null line or neutral line
~	AC (alternating current)	L	Live line
≂	AC and DC	I	Power-on
3~	Three-phase current	O	Power-off
⏚	Ground	⏻	Back-up power
⏚	Protective ground	▭	Power-on state
⏚	Chassis ground	▯	Power-off state
⊥	Signal ground	⚠	Risk of electric shock
WARNING	Hazardous sign	⚠	High temperature warning
Caution	Be careful	⚠	Warning

3 Inspection & Installation

3.1 Inspection

After receiving N3410, please check the instrument according to the following steps:
1. Check whether the instrument is damaged during transportation. If any severe damage to the package, please contact our authorized distributor or TOYOTECH.
2. Check accessories.
3. Check the whole instrument. If N61100 chassis is damaged or has abnormal operation, please contact our authorized distributor or TOYOTECH.

3.2 Connection to Power Cord

Before connecting the power cord, observe the following precautions to prevent electric shock and damage to the instrument:

⚠Warnings

- Make sure that the voltage matches the rated voltage of the instrument;
- Make sure the power switch is off;
- Please use the power cord supplied by our company, and connect the power cord to a three-pronged socket with a protective grounding terminal;

Connect one end of the power cord to the input socket on the back panel of the instrument and the other end to the three-pronged socket with a protective grounding terminal.

3.3 Power-ON Check

After receiving the N3410, please follow the steps:

Power ON

Press the POWER button on the front panel to turn on the power. If you find that the power does not start normally, you should first check whether the power cord is connected, whether the power supply has been supplied, and whether the power

switch has been turned on.

⚠Warnings

If the power switch is OFF, some components inside the power supply may still have a high voltage, to avoid the risk of electric shock, it is prohibited to open the cover.

Output Voltage Check

Please follow the steps below to verify the basic voltage function of the power supply at no load:

1. Turn on the power switch.

2. Set the voltage value to 1V.

3. Turn on the output ON.

4. Check that the voltage value displayed on the screen is close to the set voltage value.

5. Make sure that the voltage can be adjusted from 0V to the maximum voltage value within the range at no load.

Output Current Check

Follow the steps below to verify the basic current function of the power supply when the output is short-circuited:

1. Turn on the power switch.

2. Make sure the power supply output is OFF.

3. Connect an insulated wire to the output of the power supply to short-circuit the positive and negative terminals, and use a wire that can withstand the maximum output current of the power supply.

4. Set the current value to 1A.

5. Turn on the output ON.

6. Check whether the current displayed on the screen is close to the set current

value.

7. Ensure that the current can be adjusted from 0A to the maximum current value within the range.

3.4 Wiring

3.4.1 Front Panel Output

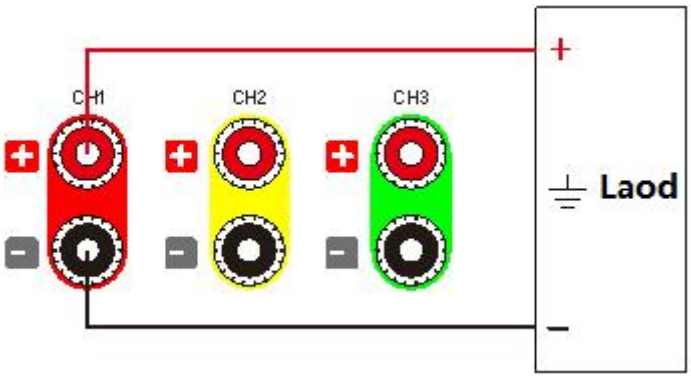

Figure 1 Wiring Schematic

3.4.2 Rear Panel Output

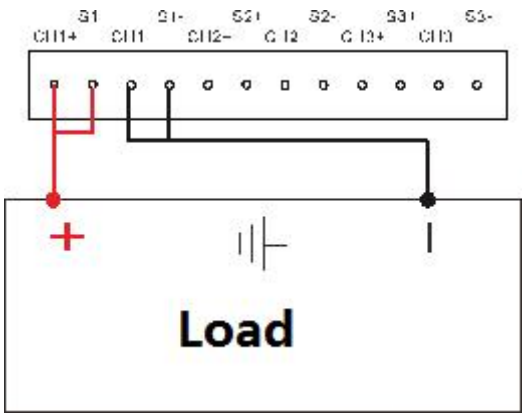

Figure 2 Wiring Schematic

4 Product

4.1 Brief Introduction

N3410 series is a triple-channel programmable DC power supply with high performance and high reliability. N3410 is with half 19 inch 2U size, integrating three independent output channels, and supporting both front and rear wiring. It has compact size and elegant appearance. N3410 supports both benchtop application with carrying handle and tilt stand, and supports rack installation for system integration. Test and measurement information is displayed intuitively on the 4.3 inch LCD screen. DVM measurement function is optional.

4.1.1Features

- Each channel isolated, programmable and controllable
- High accuracy and resolution, as low as 0.1mV/0.1mA [1]
- Low ripple&noise, Vrms less than 400μV, Vp-p less than 5mV
- Dynamic response time less than 1ms
- Sequence(SEQ) test function[2]
- Half 19 inch 2U size with tilt stand
- Graph for real-time output waveform display[3]
- Programmable hardware OVP and OCP protection
- Intelligent fan control
- High accuracy DVM measurement (for N3411P/N3412P/N3413P only)
- Supporting series, parallel and trace output modes
- Front and rear output terminals
- Communication interfaces: LAN/RS232

Remark 1: N3411E/N3412E/N3413E are with 10mV/1mA resolution.

Remark 2: SEQ is not available for N3411E/N3412E/N3413E.

Remark 3: Graph is not available for N3411E/N3412E/N3413E

4.2 Dimension

N3411 Series: 214mm(W)*435.6mm(D)*88.0mm(H);
N3412/N3413 Series: 214mm(W)*481.6mm(D)*88.0mm(H)

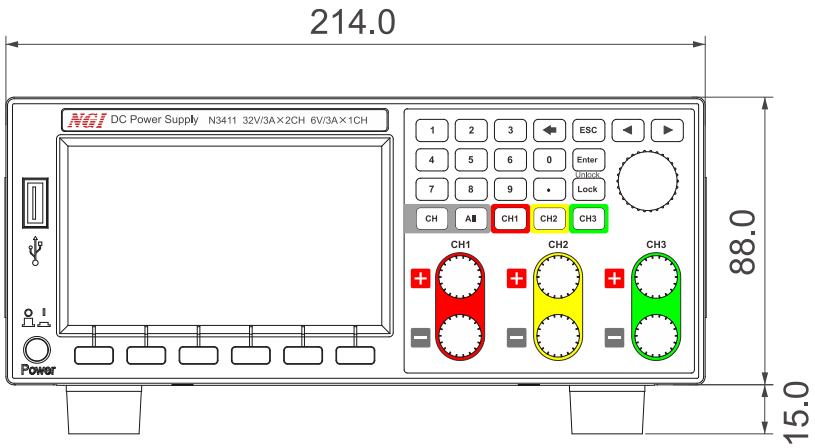

Figure 3 Front Panel Dimension(mm)

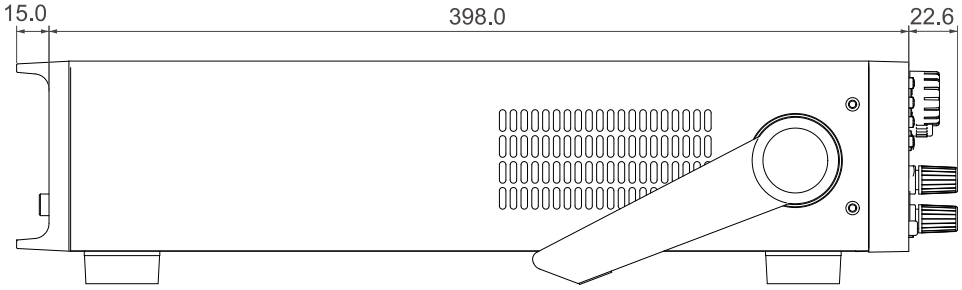

Figure 4 N3411 Series Master Chassis side Dimension(mm)

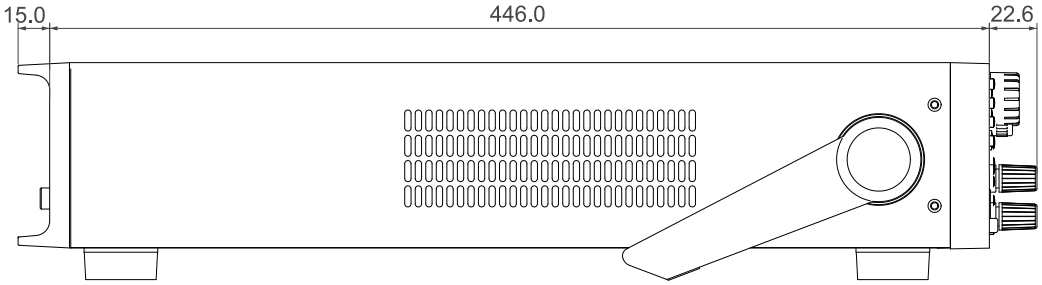

Figure 5 N3412/N3413 Series Master Chassis side Dimension(mm)

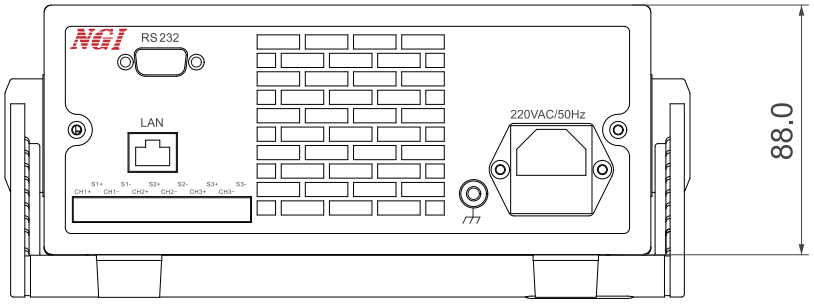

Figure 4 Rear Panel Dimension(mm) (N341X/N341XE Series)

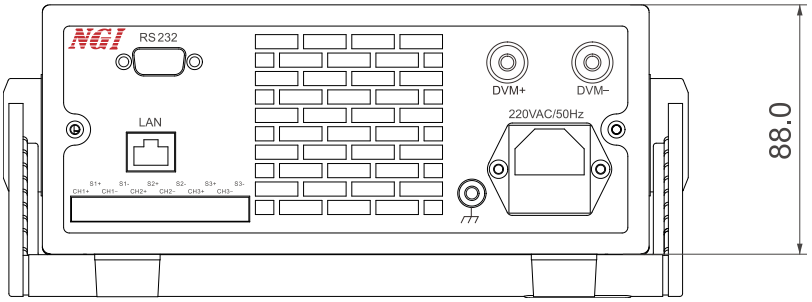

Figure 5 Rear Panel Dimension(mm) (N341XP Series)

4.3 Front Panel Introduction

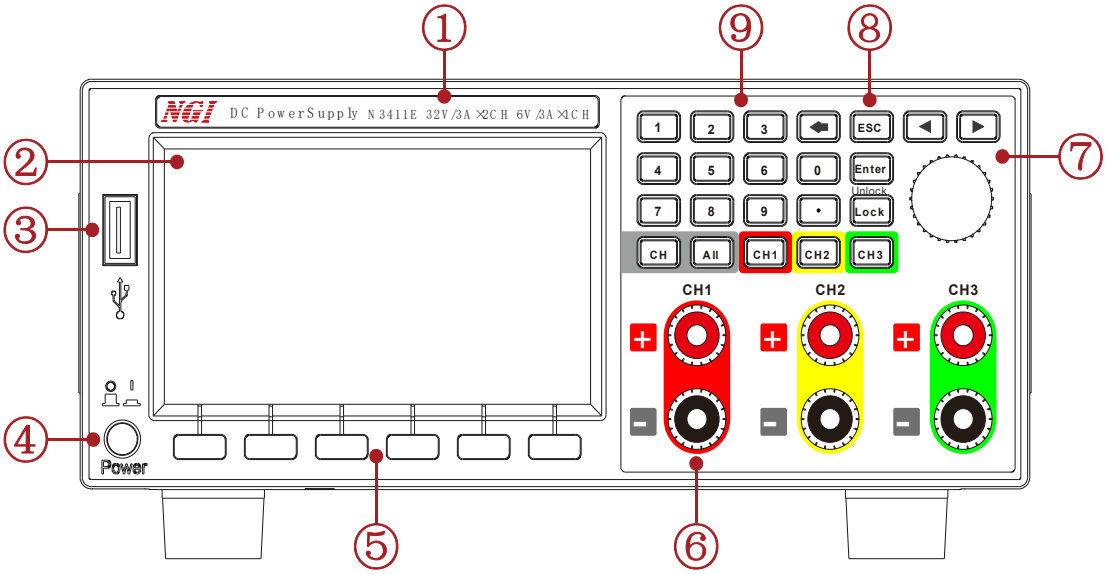

Figure 6 Front Panel

Table 2

Number	Name	Function
1	Device model	Displaying model number
2	Screen	Displaying data
3	USB port	For USB flash drive connection
4	Power switch	Power control
5	Switch button	Shortcut button for the function at the bottom of screen
6	Output interface	Output interface, red for positive(+), black for negative(-)
7	Knob/left&right arrow	By rotating knob: to select the required item, adjust the parameter By pressing knob: to enter the edit interface, confirm the input
8	Function button	Please see below chapter description.
9	Numeric button	For digit input

4.3.1 Function Button

Table3

Button	Function
CH	Channel switch
All	To turn on/off the output for all three channels
CH1 ~ CH3	Single channel control
Unlock Lock	To lock/unlock
Enter	To confirm
ESC	To exit
←	To delete
◄ ►	To move the cursor

4.3.2 Output Port

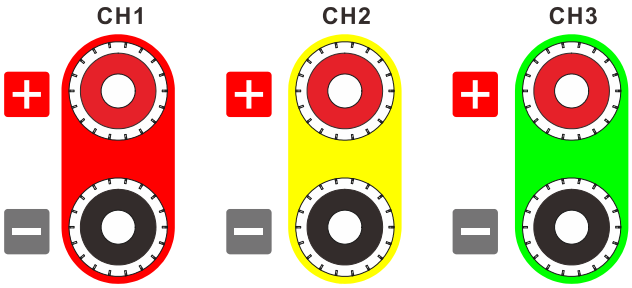

Figure 7 Front Panel Output Terminal

4.4 Rear Panel Introduction

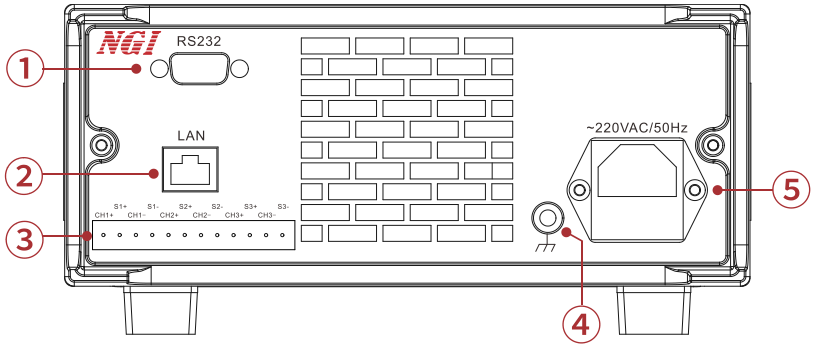

Figure 8 Rear Panel (N341X/N341XE Series)

Table 4

Number	Name
1	RS232 interface
2	LAN port
3	Output interface
4	Grounding screw
5	AC power socket

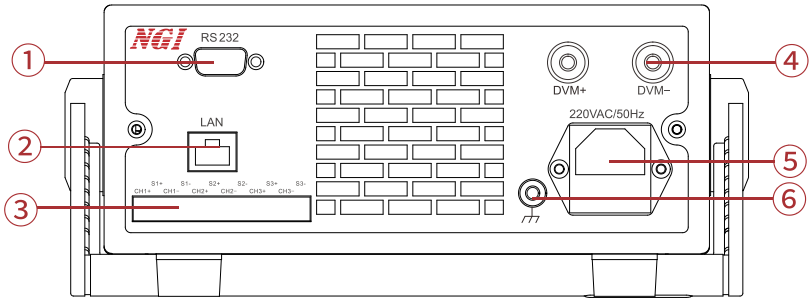

Figure 9 Rear Panel (N341XP Series)

Table 5

Number	Name
1	RS232 interface
2	LAN port
3	Output interface
4	DVM interface
5	AC power socket
6	Grounding screw

4.4.1 AC Input Connection

Notes for AC power input connection:

- Single phase input, Please refer to the voltage mark at the rear panel.
- Reliable ground ⏚

4.4.2 LAN Port

The default connection to PC is via Ethernet. An Ethernet cable is provided as standard accessory in N3410 accessory bag.

Steps for connection to PC:

1. Check if N3410 is switched on properly.
2. Make sure the PC is switched on and its LAN port is working properly.
3. Connect one end of Ethernet cable to PC LAN port.
4. Connect another end of Ethernet cable to N3410 LAN port.
5. Check if the indicator light at LAN port on N3410 is flashing.

Note 1: If the indicator light at LAN port on N3410 does not flash after the Ethernet cable was plugged, please check whether the LAN port on computer is working properly and make sure the computer is switched on correctly.

Note 2: After completing the above operations, the indicator light at LAN port on N3410 will stop after a short flash. At this time, the hardware network connection has been established.

4.4.3 RS232 Serial Connection

N3410 can be controlled by RS232 interface. A RS232 cable is provided as standard accessory in N3410 accessory bag.

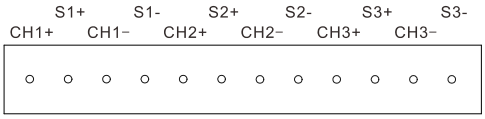

Figure 10 RS232 Interface

Table 6

Pin	Description
CH1+	Channel 1 positive (+) output terminal
S1+	Channel 1 Remote Sample Positive(+)
CH1-	Channel 1 negative(-) output terminal
S1-	Channel 1 Remote Sample Negative(-)

4.4.4 Grounding Screw

The chassis of N3410 is insulated from the inner live conductor. Normally, the chassis is uncharged. If there is an accident which causes the chassis to be charged, there is a potential difference between the chassis and the ground at this time. If it is not well grounded and the operator accidentally touches the chassis, it will form a closed-circuit through the human body and cause danger. Therefore, a reliable grounding must be made between the chassis and ground to have the same potential. In addition, a reliable grounding can also prevent the accumulation of static electricity.

5 Operation

5.1 Interface

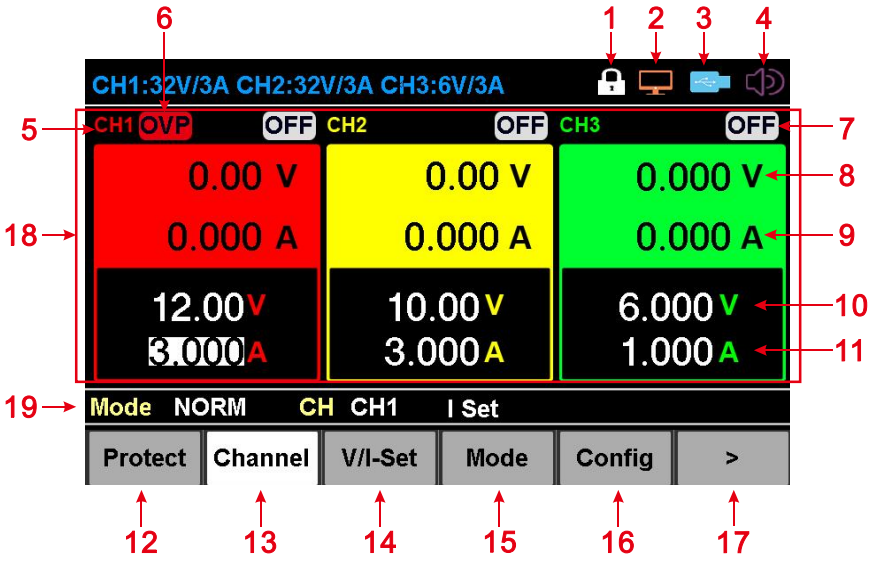

Figure 11 Screen

1. Lock icon

When this icon shows, it means N3410 buttons are locked. The other buttons are invalid in this case.

2. Ethernet connection icon

When this icon shows, it means N3410 has been connected to PC or other control devices through the Ethernet cable.

3. USB connection icon

When this icon shows, it means a USB flash drive has been connected to N3410 through the USB port.

4. Beeper icon

When this icon shows, it means beeper setting is ON.

5. Channel icon

It shows the channel number of three channels.

6. Alarm

The protection of specific channel occurs.

7. Channel state

There are three states: OFF, CV ON and CC ON.

8. Readback voltage
9. Readback current
10. Setting voltage
11. Setting current
12. Protect setting

Users can set over voltage and over current protection value of three channels separately.

13. Channel switch

Users can press the corresponding button below **Channel** to switch among channel 1 to 3.

14. V/I Set

The cursor will switch between voltage setting and current setting by continuously pressing the corresponding button under **V/I Set**.

15. Mode switch

There are fours options: normal, series, parallel and trace.

16. Config

Users can configure the system parameters.

17. More

There are extra four options: Timer, SEQ, Graph and About Us.

18. The readback and setting interface of three channels

The first channel is red. The second channel is yellow. The third channel is green.

19. The present mode, selected channel and cursor position

5.2 V/I Set

Take channel 2 for example to set voltage and current.

1. Press button below **Channel** on the screen to switch to channel 2.
2. Press button below **V/I-Set** on the screen and move cursor to voltage/current setting area.
3. Press  or 

.
4. Input digit by pressing numeric buttons or pressing  to move the cursor and rotate  to adjust the value.

5. Press ◯ or Enter to confirm the setting.

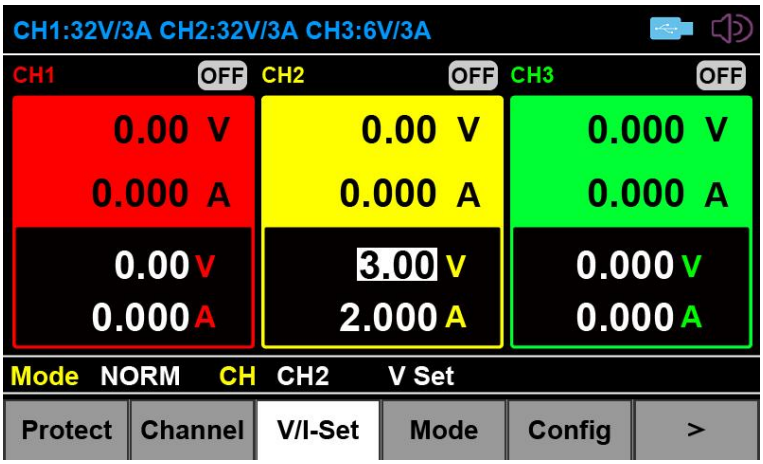

Figure 12 Voltage/Current Setting

5.3 Protect

The OVP/OCP setting range of N3410 series is shown below. By default, OVP/OCP is set to the maximum value.

Table 7

Model	N3411	N3412	N3413
OVP Setting Range (CH1/CH2)	0~64.05V	0~64.05V	0~127.05V
OCP Setting Range (CH1/CH2)	0~6.5A	0~10.71A	0~6.5A

Steps to set protection parameters:

1. Press button below **Protect** on the screen.
2. Press ◯ or Enter on OVP/OCP setting area.
3. Input digit by pressing numeric buttons or pressing ◄ ► to move the cursor and rotate ◯ to adjust the value.
4. Press ◯ or Enter to confirm the setting.
5. Press button below **Channel** on the screen to switch to other channels.
6. Press ＜ to return to previous page.

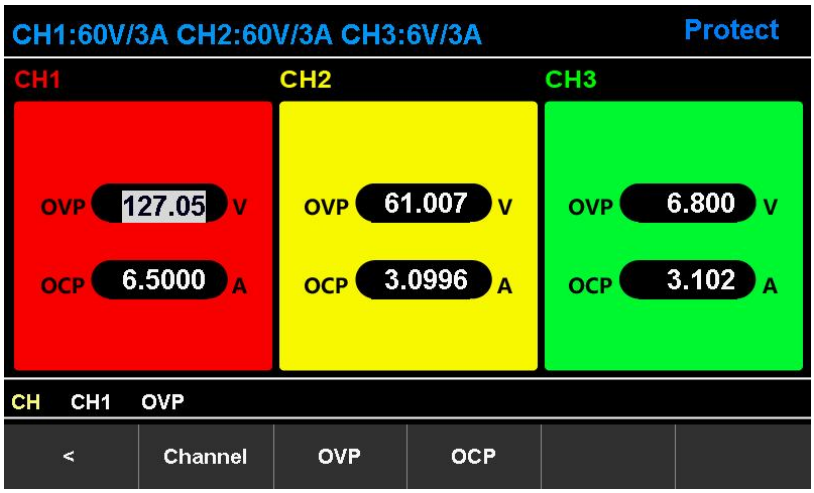

Figure 13 Protection Setting

When the output voltage/current is higher than OVP/OCP set value, N3410 will shut off output, and alarm OVP/OCP will be displayed on the screen. At this time, users can press for three times continuously to clear the protection.

When overvoltage/overcurrent protection occurs, please also check whether OVP/OCP setting value is lower than output voltage/current. If this is not the case, please contact our authorized distributor or TOYOTECH.

Note: When overvoltage/overcurrent occurs, the protection circuit inside N3410 will shut off output. If an active load such as a battery is connected to N3410 output interface, when overvoltage/overcurrent occurs, the current from the active load such as the battery is poured into the internal circuit of N3410, which will damage N3410. To avoid this situation, users can connect a diode in series with the output interface, as shown in the figure below.

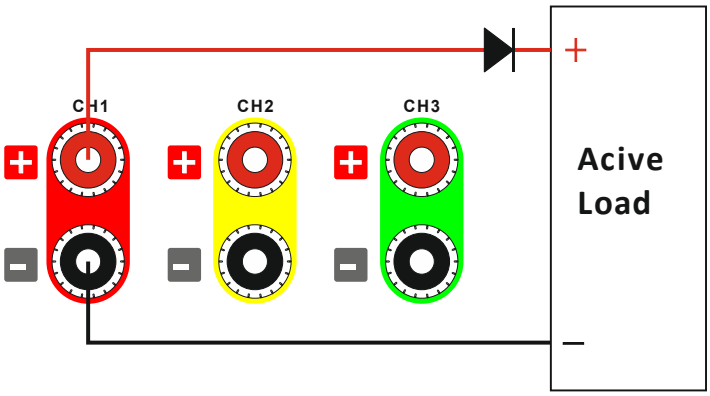

Figure 14 Active load wiring diagram

5.4 Output Mode Setting

Please press the button below **Mode** on the screen to enter output mode setting. The default is normal (NORM) mode. In normal mode, channel 1, channel 2, and channel 3 output separately and are set individually. The other three optional output modes are parallel (PARALL), series (SERIES), and trace (TRACE) modes. Users can switch to the corresponding mode by pressing the corresponding button below the different modes, as shown in the figure below.

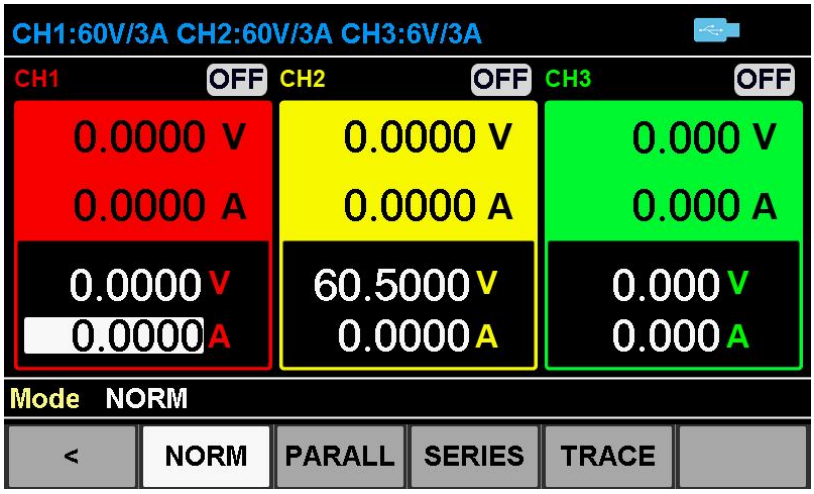

Figure 15 Output Mode Setting

5.4.1 Parallel Mode

Please press the button below **PARALL** on the screen and switch to parallel mode.

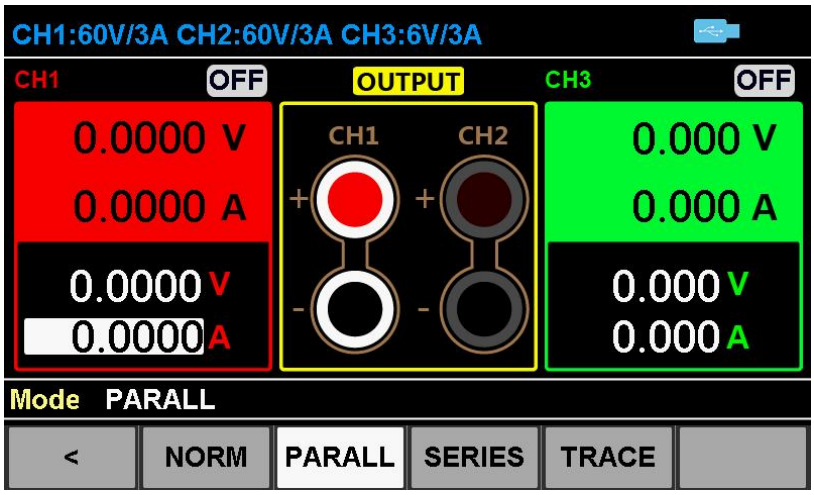

Figure 16 Parallel Mode

In parallel mode, the power supply can output 0-6A for N3411E/N3413E/N3411/N3411P/N3413/N3413P and 0-10A for N3412E/N3412/N3412P. The power supply can output 0-32V for

N3411E/N3412E/N3411/N3411P/N3412/N3412P and 0-60V for N3413E/ N3413/N3413P. The parallel connection method is shown in the figure below.

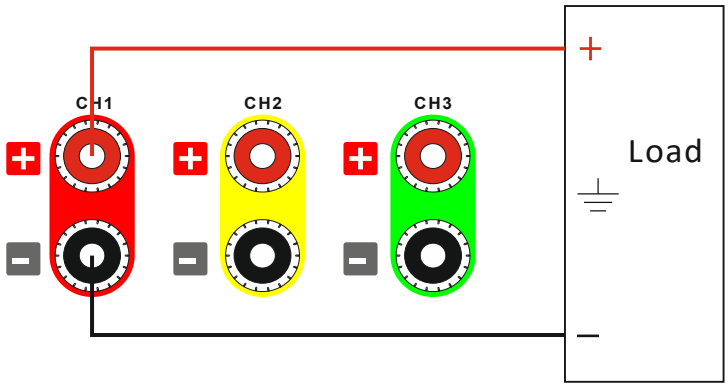

Figure 17 Parallel Mode Wiring Diagram

Steps to set voltage and current in parallel mode:

1. Press or Enter on voltage/current setting area.
2. Input digit by pressing numeric buttons or pressing ◄ ► to move the cursor and rotate to adjust the value.
3. Press or Enter to confirm the setting.

After completing setting, please press CH1 . ON icon will show at channel 1 and channel 2. The power supply starts output.

5.4.2 Series Mode

Please press the button below **SERIES** on the screen and switch to series mode.

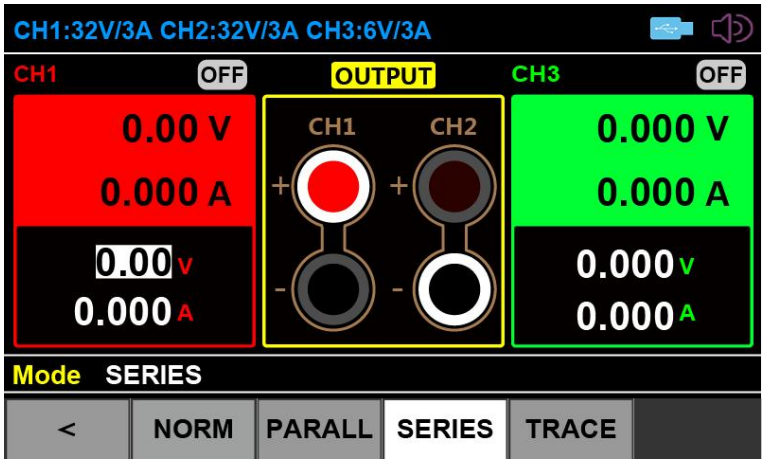

Figure 18 Series Mode

In series mode, the power supply can output 0-64V for N3411E/N3412E/N3411/N3411P/N3412/N3412P and 0-120V for N3413E/N3413/N3413P. The power supply can output 0-3A for N3411E/N3413E/N3411/N3411P/N3413/N3413P and 0-5A for N3412E/ N3412/N3412P. The series connection method is shown in the figure below.

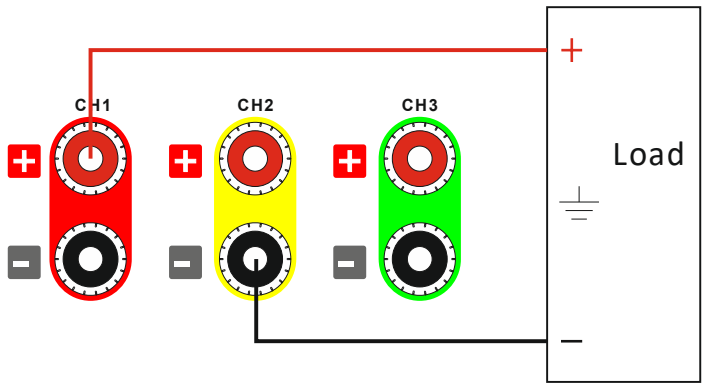

Figure 19 Series Mode Wiring Diagram

Steps to set voltage and current in series mode:

1. Press or Enter on voltage/current setting area.
2. Input digit by pressing numeric buttons or pressing ◄ ► to move the cursor and rotate to adjust the value.
3. Press or Enter to confirm the setting.

After completing setting, please press CH1 . ON icon will show at channel 1 and channel 2. The power supply starts output.

Note: It is not recommended to use constant current in series mode.

5.4.3 Trace Mode

Please press the button below **TRACE** on the screen and switch to trace mode.

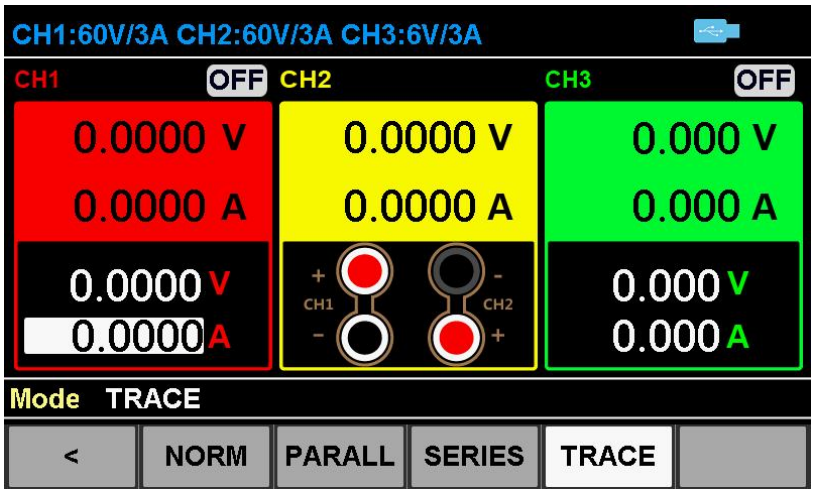

Figure 20 Trace Mode

In trace mode, channel 2 follows channel 1 to output the same value of negative voltage and negative current. Channel 2 trace voltage output can be set to -32V, and current output can be set to -3A, following channel 1. The trace connection method is shown in the figure below.

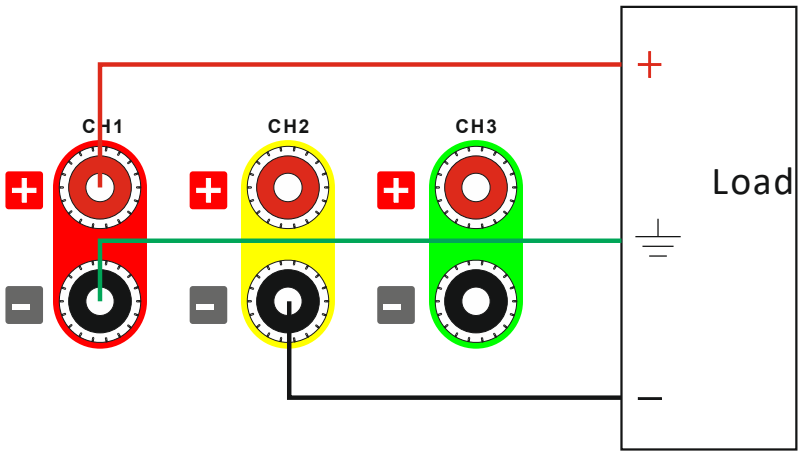

Figure 21 Trace Mode Wiring Diagram

Steps to set voltage and current in trace mode:

1. Press or Enter on voltage/current setting area.
2. Input digit by pressing numeric buttons or pressing ◄ ► to move the cursor and rotate to adjust the value.
3. Press or Enter to confirm the setting.

After completing setting, please press CH1 . ON icon will show at channel 1 and channel 2. Channel 2 follows channel 1 to output the same voltage and current in

negative.

5.5 Configuration

Users can set IP address, baud rate, beeper, sample rate and output position in configuration interface.

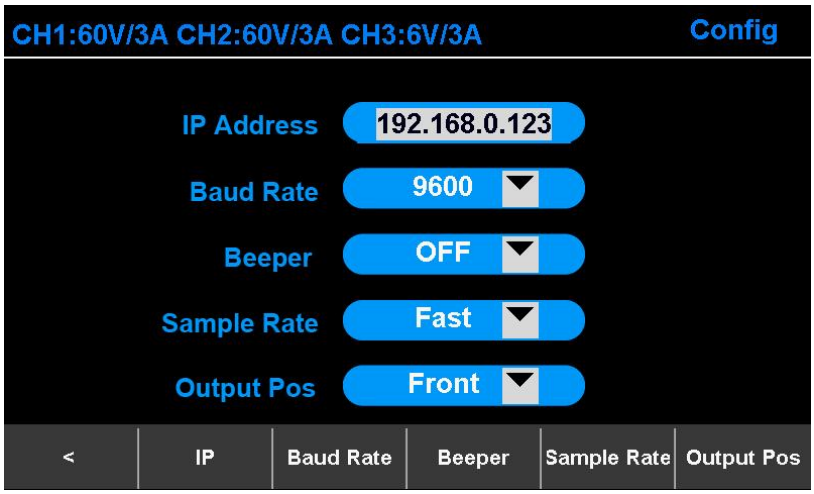

Figure 22 Configuration Interface

Steps to set parameters under **Config**:

1. Press button below **Config** on the screen to enter configuration interface.
2. Press button below **IP** on the screen.
3. Press or Enter on IP address setting area.
4. Input digit by pressing numeric buttons or pressing ◄ ► to move the cursor and rotate to adjust the value.
5. Press or Enter to confirm the setting.
6. Press buttons below **Baud Rate/Beeper/Sample Rate/Output Pos** separately.
7. Press or Enter on Baud Rate/Sound/Sample Rate/Output Pos setting area.
8. Press ◄ ► or rotate to select the required parameter.
9. Press or Enter to confirm the setting.

Note: Output Pos is for output wiring position. The options are front and rear.

5.6 SEQ

The principle of sequence mode is easy to understand. it outputs voltage and current according to the test steps edited by the user, and switches to the next step when the time of a single step is reached.

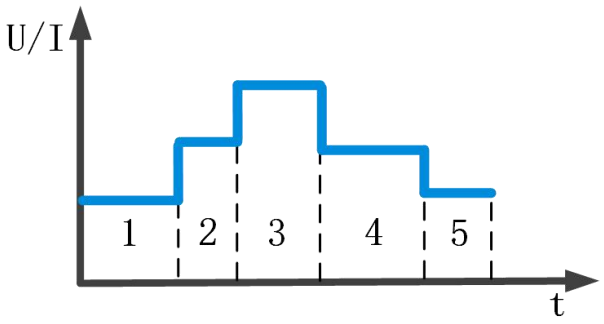

Figure 23 SEQ mode

Please press ＞ to find more functions and press button below **SEQ** on the screen.

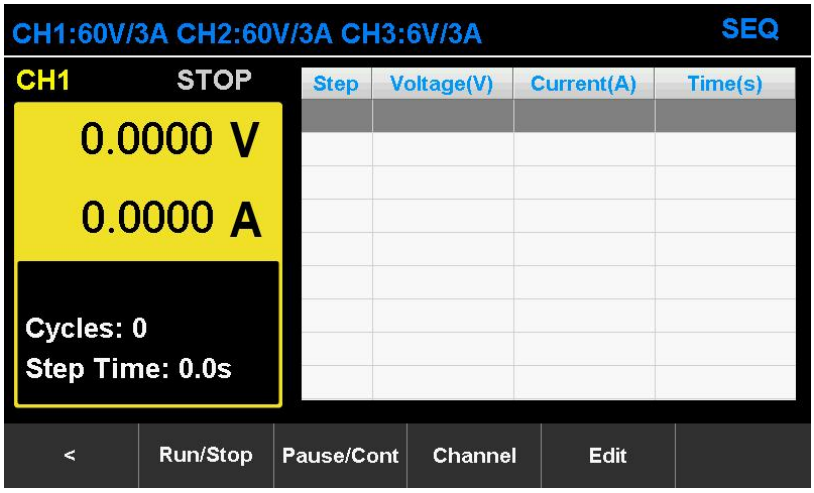

Figure 24 SEQ Interface

- Run/Stop
- Pause/Cont: pause or continue
- Channel: channel switch
- Edit: SEQ file edit

5.7 SEQ Edit

Please press button below **Edit** on the screen under SEQ interface.

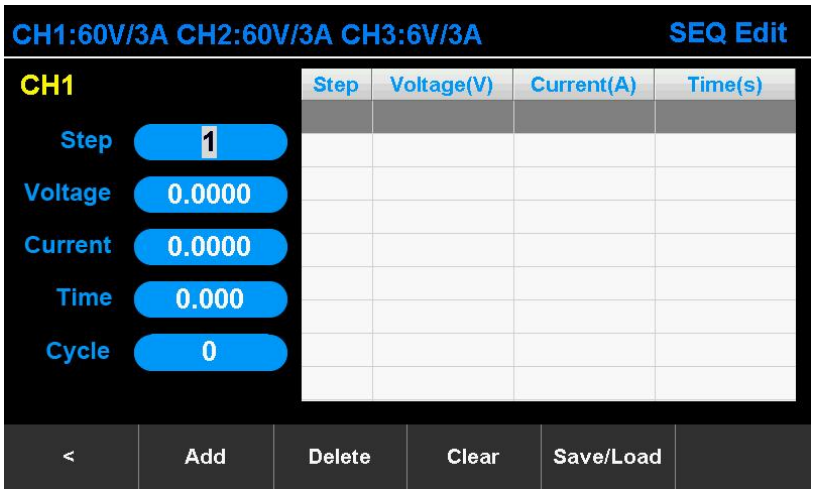

Figure 25 SEQ Edit

Table 8

NO.	Item	Function
1	Step	Toggles the current test step, up to 500 steps
2	Time	Set the step running time, range 0.001 to 60000s
3	Voltage	Set voltage
4	Current	Set current
5	Cycle	Cycle times

- Add

The operation steps can be added by pressing button below Add on the screen. It supports maximum 500 steps. The setting procedure is as follows.

Rotate ◯ or press ◄ ► to move cursor to **Step**→ Press ◯ or Enter → Input digits by numeric buttons→ Press ◯ or Enter to confirm setting.

- Delete: delete the present step
- Clear: clear all steps
- Save/Load: save or download

Please press button below **Save/Load** on the screen to enter SEQ Load interface. Please rotate ◯ or press ◄ ► to move to the required parameter. There are four parameters: Operation, Position, File name and Start Load.

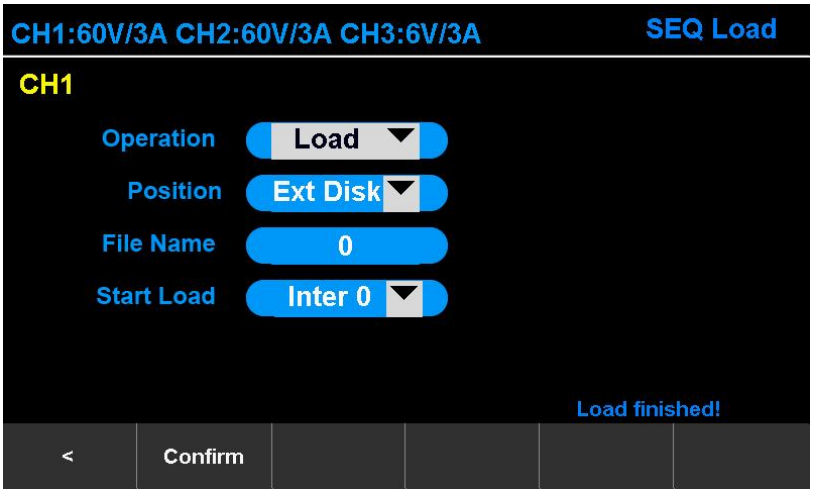

Figure 26 SEQ Load

- Operation: two options- Load or Save
- Position: select the storage position for Save/Load. Options are Ext Disk(USB flash drive) and Inter N(N3410, N for 0-9).
- File name: set file name
- Start Load

After N3410 is turned on, the device will load the file saved in this location to the local location.

5.8 Timer

After the timer function is turned on, at this time users start output of the power supply, the countdown starts on the interface. When the time is up, the power supply shuts off the output. The time accuracy is 1s. In the power output state, the countdown is still workable with timer function turned off. Every time a channel output is turned on, the countdown will start again.

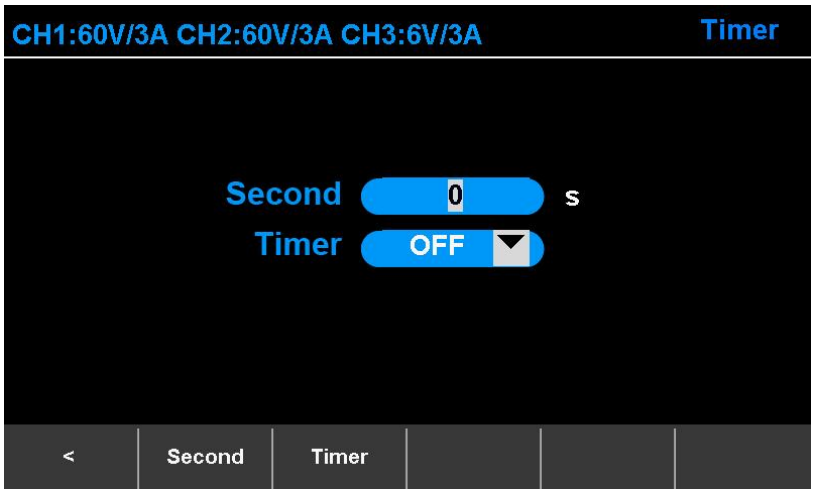

Figure 27 Timer Setting

Steps to set parameters under **Timer**:

1. Press ＞ to find more functions.
2. Press button below **Timer** on the screen to enter timer interface.
3. Press button below **Second** on the screen.
4. Press ◯ or Enter on time setting area.
5. Input digit by pressing numeric buttons or pressing ◄ ► to move the cursor and rotate ◯ to adjust the value.
6. Press ◯ or Enter to confirm the setting.
7. Press button below **Timer**.
8. Press ◯ or Enter on Timer setting area.
9. Press ◄ ► or rotate ◯ to select the required state.
10. Press ◯ or Enter to confirm the setting.

5.9 Graph

Please press ＞ to find more functions and press button below **Graph** on the screen.

The Graph interface can display the real-time graph of voltage and current of the specific channel, as shown in the figure below.

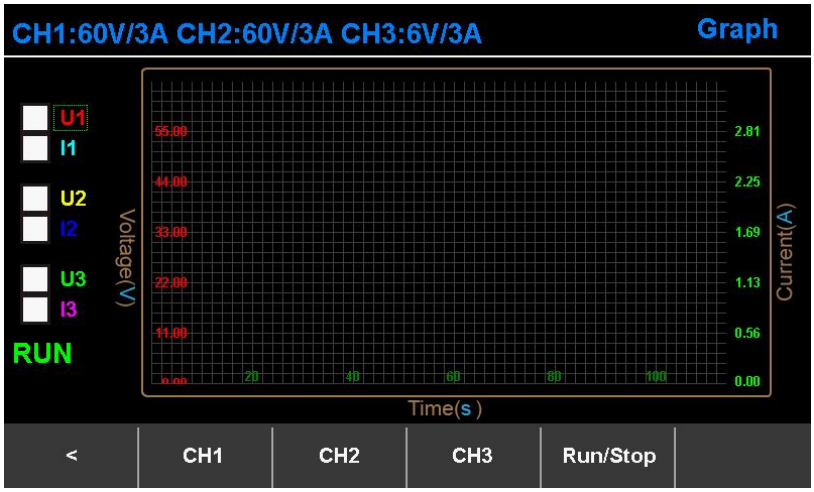

Figure 28 Graph Interface

- CH1/CH2/CH3: set displaying or concealing the graph for specific channel
- Run/Stop

6 Maintenance and Self-inspection

6.1 Regular Maintenance

Clean the Device

Please wipe lightly the device with a dry or slightly wet cloth, and do not wipe the inside of it. Make sure the power is disconnected before cleaning.

⚠**Warning: Disconnect power before cleaning.**

6.2 Fault Self-inspection

Device Fault Self-inspection

Due to system upgrade or hardware problem, the device may break down. Please do the following necessary inspection to eliminate the troubles, which can save your maintenance and time cost. If the troubles cannot be recovered, please contact TOYOTECH.

The inspection steps are as below.

- Check whether the device is powered.
- Check whether the device can be turned on normally.
- Check whether the fuse has no damage.
- Check whether other connectors are correct, including wire cables, plug, etc.
- Check whether the system configuration is correct.
- Check whether all the specifications and performances are within the device working range.
- Check whether the device displays error information.
- Operate on a replacement device.

Calibration Intervals

It is suggested that N3410 series should be calibrated once a year.

7 Main Technical Data

Attention:

The measurement accuracy is identified by the following three conditions: within one year after calibration, operation temperature between 18℃ and 28℃, and the relative humidity up to 80%.

Please warm up the device for half hour to ensure the measurement accuracy.

Table 9

Model	N3411E		N3412E		N3413E	
Channel	CH1/CH2	CH3	CH1/CH2	CH3	CH1/CH2	CH3
Voltage	32V	6V	32V	6V	60V	6V
Current	3A	3A	5A	3A	3A	3A
Series Mode-Voltage	64V	N/A	64V（5A）	N/A	120V（3A）	N/A
Parallel Mode-Current	6A	N/A	10A	N/A	6A（60V）	N/A
Total Power	210W		338W		378W	
Setting Resolution-Voltage	10mV	1mV	10mV	1mV	10mV	1mV
Setting Resolution-Current	1mA					
Setting Accuracy-Voltage (23±5℃)	＜0.01%＋20mV	＜0.03%＋10mV	＜0.01%＋20mV	＜0.03%＋10mV	＜0.02%＋40mV	＜0.03%＋10mV
Setting Accuracy-Current (23±5℃)	＜0.05%＋10mA	＜0.05%＋10mA	＜0.05%＋20mA	＜0.05%＋10mA	＜0.05%＋10mA	＜0.05%＋10mA
Setting Temperature Coefficient	50ppm/℃					
Readback Resolution-Voltage	10mV	1mV	10mV	1mV	10mV	1mV
Readback Resolution-Current	1mA					
Readback Accuracy-Voltage (23±5℃)	＜0.01%＋20mV	＜0.03%＋10mV	＜0.01%＋20mV	＜0.03%＋10mV	＜0.02%＋40mV	＜0.03%＋10mV
Readback Accuracy-Current (23±5℃)	＜0.05%＋10mA	＜0.05%＋10mA	＜0.05%＋20mA	＜0.05%＋10mA	＜0.05%＋10mA	＜0.05%＋10mA
Readback Temperature Coefficient	50ppm/℃					
Long-term Stability	≤50ppm/1000h					

Voltage Ripple Noise (20Hz～20MHz)	≤5mVp-p	≤10mVp-p	≤5mVp-p	≤10mVp-p	≤10mVp-p	≤10mVp-p
Voltage Ripple Noise (20Hz～20MHz)	≤1mVrms					
Current Ripple Noise (20Hz～20MHz)	≤3mArms					
	Dynamic Characteristics					
Voltage Rise Time (no load) (10%-90%F.S. Variation Time)	20ms					
Voltage Rise Time (full load) (10%-90%F.S. Variation Time)	50ms	21ms	50ms	21ms	50ms	21ms
Voltage Fall Time (no load) (90%-10%F.S. Variation Time)	400ms	200ms	400ms	200ms	800ms	200ms
Voltage Fall Time (full load) (90%-10%F.S. Variation Time)	45ms	13ms	45ms	13ms	45ms	13ms
Transient Recovery Time	≤1ms					
Line Regulation-Voltage	≤0.01%+1mV	≤0.01%+3mV	≤0.01%+1mV	≤0.01%+3mV	≤0.01%+1mV	≤0.01%+3mV
Line Regulation-Current	≤0.01%+1mA	≤0.02%+3mA	≤0.01%+3mA	≤0.02%+3mA	≤0.01%+3mA	≤0.02%+3mA
Load Regulation-Voltage	≤0.01%+3mV					
Load Regulation-Current	≤0.01%+3mA	≤0.02%+3mA	≤0.01%+3mA	≤0.02%+3mA	≤0.01%+6mA	≤0.02%+3mA
	Others					
Isolation (Output to Ground)	500VDC					
Communication Response Time	≤5ms					
Interface	LAN/RS232					
AC Input	Single phase, please refer to the voltage mark at the rear panel.					
Temperature	Operating temperature: 0℃-40℃, storage temperature: -20℃~60℃					
Operating Environment	Altitude <2000m, relative humidity: 5%-90%RH(non-condensing), atmospheric pressure: 80-110kPa					
Dimension	88（H）*214（W）*435.6（D）		88（H）*214（W）*481.6（D）			
Net Weight	Approx. 9kg		Approx. 11kg			

Table 10

Model	N3411/N3411P		N3412/N3412P		N3413/N3413P	
Channel	CH1/CH2	CH3	CH1/CH2	CH3	CH1/CH2	CH3
Voltage	32V	6V	32V	6V	60V	6V
Current	3A	3A	5A	3A	3A	3A
Series Mode-Voltage	64V	N/A	64V（5A）	N/A	120V（3A）	N/A
Parallel Mode-Current	6A	N/A	10A	N/A	6A（60V）	N/A
Total Power	210W		338W		378W	
Setting Resolution-Voltage	0.1mV	1mV	0.1mV	1mV	0.1mV	1mV
Setting Resolution-Current	0.1mA	1mA	0.1mA	1mA	0.1mA	1mA
Setting Accuracy-Voltage (23±5℃)	＜0.01%＋10mV	＜0.03%＋10mV	＜0.01%＋10mV	＜0.03%＋10mV	＜0.02%＋20mV	＜0.03%＋10mV
Setting Accuracy-Current (23±5℃)	＜0.05%＋5mA	＜0.05%＋10mA	＜0.05%＋10mA	＜0.05%＋10mA	＜0.05%＋5mA	＜0.05%＋10mA
Setting Temperature Coefficient	30ppm/℃					
Readback Resolution-Voltage	0.1mV	1mV	0.1mV	1mV	0.1mV	1mV
Readback Resolution-Current	0.1mA	1mA	0.1mA	1mA	0.1mA	1mA
Readback Accuracy-Voltage (23±5℃)	＜0.01%＋10mV	＜0.03%＋10mV	＜0.01%＋10mV	＜0.03%＋10mV	＜0.02%＋20mV	＜0.03%＋10mV
Readback Accuracy-Current (23±5℃)	＜0.05%＋5mA	＜0.05%＋10mA	＜0.05%＋10mA	＜0.05%＋10mA	＜0.05%＋5mA	＜0.05%＋10mA
Readback Temperature Coefficient	30ppm/℃					
Long-term Stability	≤50ppm/1000h					
Voltage Ripple Noise (20Hz～20MHz)	≤5mVp-p	≤10mVp-p	≤5mVp-p	≤10mVp-p	≤10mVp-p	≤10mVp-p
Voltage Ripple Noise (20Hz～20MHz)	≤1mVrms					
Current Ripple Noise (20Hz～20MHz)	≤3mArms					
	Dynamic Characteristics					
Voltage Rise Time (no	20ms					

load) (10%-90%F.S. Variation Time)						
Voltage Rise Time (full load) (10%-90%F.S. Variation Time)	50ms	21ms	50ms	21ms	50ms	21ms
Voltage Fall Time (no load) (90%-10%F.S. Variation Time)	400ms	200ms	400ms	200ms	800ms	200ms
Voltage Fall Time (full load) (90%-10%F.S. Variation Time)	45ms	13ms	45ms	13ms	45ms	13ms
Transient Recovery Time	≤1ms					
Line Regulation-Voltage	≤0.01%+1mV	≤0.01%+3mV	≤0.01%+1mV	≤0.01%+3mV	≤0.01%+1mV	≤0.01%+3mV
Line Regulation-Current	≤0.01%+1mA	≤0.02%+3mA	≤0.01%+3mA	≤0.02%+3mA	≤0.01%+3mA	≤0.02%+3mA
Load Regulation-Voltage	≤0.01%+3mV					
Load Regulation-Current	≤0.01%+3mA	≤0.02%+3mA	≤0.01%+3mA	≤0.02%+3mA	≤0.01%+6mA	≤0.02%+3mA
	DVM Measurement (For N3411P/N3412P/N3413P Only)					
Channels	1CH					
Voltage Range	±600V/±60V/±6V					
Measurement Resolution	$5\frac{1}{2}$ bits					
Measurement Accuracy	0.01%+0.01%F.S.					
Measurement Frequency	4Hz					
Input Impedance	10MΩ					
Terminal	Pluggable terminal					
Temperature Coefficient (0~40℃)	20ppm/℃					
	Others					
Isolation (Output to Ground)	500VDC					
Communication Response Time	≤5ms					
Interface	LAN/RS232					
AC Input	Single phase, please refer to the voltage mark at the rear panel.					
Temperature	Operating temperature: 0℃-40℃, storage temperature: -20℃~60℃					

Operating Environment	Altitude <2000m, relative humidity: 5%-90%RH(non-condensing), atmospheric pressure: 80-110kPa	
Dimension	88（H）*214（W）*435.6（D）	88（H）*214（W）*481.6（D）
Net Weight	Approx. 9kg	Approx. 11kg

Note 1: For other specifications, please contact TOYOTECH.
Note 2: All specifications are subject to change without notice.