User Manual

N35200 Series Wide Range High Power Bidirectional Programmable DC Power Supply

Version: V20240419

Copyright Statement

Contents

1 Preface

Dear Customers,

First of all, we greatly appreciate your choice of N35200 series DC power supply (N35200 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 N35200 series DC power supply, including installation, operation, specifications and other detailed information. 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 N35200,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

2.1 Safety Notes

This instrument is intended for use by specific personnel. Such personnel need to be able to recognize shock hazards and be familiar with necessary safety precautions to avoid potential injury. Please read and follow all installation, operation, and maintenance information carefully before using this instrument. For complete product specifications, please refer to this manual.

If the instrument is used in a manner not specified, the protective functions provided by the instrument could be impaired.

Instrument user type:

The body of safety responsibility can be an individual or a department, who is responsible for the use and maintenance of the instrument, ensures that the instrument is used within the regulation scope and operating limit, and ensures that the operator has received sufficient training.

The operator uses the instrument for its intended function. Operators need to be trained in electrical safety measures and the correct use of this instrument. Operators should be protected from electric shock and from contact with hazardous live circuits.

Maintenance personnel perform routine maintenance on the instrument to ensure proper operation, for example, setting the line voltage. Maintenance procedures are described in this manual. These steps are clearly described whether the operator can perform them.

Service personnel are trained to work on live circuits, perform safe installations, and repair this instrument. Installation and servicing procedures should only be performed by properly trained service personnel.

Before operating the instrument, please make sure the power cord is connected to a properly grounded electrical socket. Before each use, please inspect connecting cables, test leads, and jumpers for frayed or broken wires.

Please be careful when there is a risk of electric shock during use. Hazardous voltages may be present in the cable connector jacks or test fixtures. There is a danger of electric shock when the voltage level exceeds 30Vrms, 42.4Vpeak or 60V DC, please take precautions.

During the operation and use of this instrument, please strictly observe the following safety precautions. Failure to observe the following safety precautions or specific warnings indicated elsewhere in this manual may impair the protection provided by the instrument.

The user shall be responsible for the consequences caused by the user's failure to comply with the safety precautions.

Safety Precautions

- **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 N35200’s rated range.

2.2 Safety Symbols

The following terms or symbols may appear in this manual or on the instrument.

Remarks/Notes

Remarks/Notes indicate reminders. It requires an attention before performing an operational step, and provides the operator with tips or supplementary information.

Warnings

Warnings indicates danger. It requires an attention before performing an operational step, and indicates conditions and actions that may endanger the life of the operator. Be sure to read the relevant information carefully before performing the specified procedure.

Table 1 Safety Symbols

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

2.3 Operating Environment

N35200 series DC power supply is suitable for indoor and low-condensation areas. Its general operating environment requirements are listed as below.

Operating Environment	Requirement
Operating temperature	0℃ ~ 40℃
Relative humidity	5% ~ 90%　(non-condensing)
Storage temperature	-20℃ ~ 70℃
Altitude	＜ 2000m
Atmospheric pressure	80kPa ~ 110kPa
AC Input	Three phase, 340V AC ~ 480V AC
Frequency	45Hz ~ 66Hz

3 Product

3.1 Brief Introduction

N35200 series is a wide range high-power bidirectional programmable DC power supply that integrates both power supply and feedback load functions. N35200 adopts dual quadrant design, which can supply&absorb the power, and return power to the grid cleanly, so as to save the power consumption and reduce the space heat dissipation, which can greatly reduce the test cost. N35200 has a wide range of measuring applications, with single power range of 6kW to 180kW, current range up to 1200A, voltage range up to 1500V, and master-slave parallel expansion power up to 1.8MW. N35200 series provides high precision measurement and multiple testing functions, which can be widely used in new energy, automotive, energy storage, semiconductor, photovoltaic, electric drive and other industries.

3.2 Main Features

- Single Device Range: voltage 0～1500V, current ±1200A, power ±6kW～±180kW
- Supporting master/slave parallel control mode, extended power up to 1.8MW
- Two quadrants seamless switching, the current between the DUT and the grid flow bidirectional
- Voltage accuracy 0.02%F.S., current accuracy 0.1%F.S.
- Supporting battery charge/discharge test
- CC/CV priority selection function, adjustable voltage&current slew rate
- Internal resistance simulation function, output timing function, voltage output ramp function
- Multiple protection functions, OVP, UVP, ±OCP, ±OPP, OTP, power failure protection
- LAN port and RS232 interface as standard, GPIB, CAN, RS485 and USB as optional
- Supporting PV matrix I-V curve simulation function (optional)
- Equipped with high-voltage isolation digital & analog, and monitoring

interfaces

3.3 Overview

3.3.1 N35200 Series Basic Parameter

The below table lists the models and basic parameters of the N35200 series products that use a standard 19-inch 3U chassis. The N35200 series supports higher-power models. For details, please consult the TOYOTECH sales team.

Table 2

Model	Specification	Size
N35205-80-150	80V/150A/5kW	3U
N35206-300-75	300V/75A/6kW	3U
N35206-500-40	500V/40A/6kW	3U
N35206-800-25	800V/25A/6kW	3U
N35210-80-300	80V/300A/10kW	3U
N35212-300-150	300V/150A/12kW	3U
N35212-500-80	500V/80A/12kW	3U
N35212-800-50	800V/50A/12kW	3U
N35212-1000-40	1000V/40A/12kW	3U
N35212-1500-25	1500V/25A/12kW	3U
N35215-80-450	80V/450A/15kW	3U
N35218-300-225	300V/225A/18kW	3U
N35218-500-120	500V/120A/18kW	3U
N35218-800-75	800V/75A/18kW	3U
N35218-1500-40	1500V/40A/18kW	3U
N35218-2250-25	2250V/25A/18kW	3U

3.3.2 Appearance & Dimension

3U chassis size (including output shield) is 132.5mm(H)*482.0mm(W)*752mm(D).

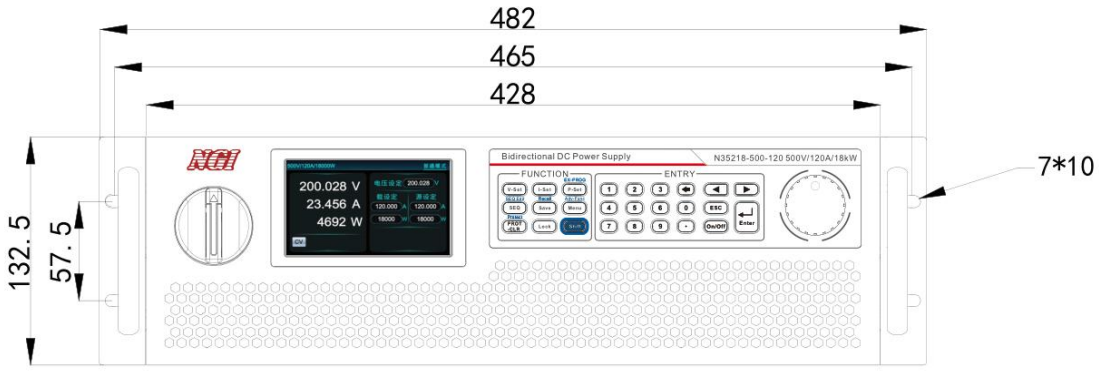


Figure 1 3U Chassis Front Panel Dimension(mm)

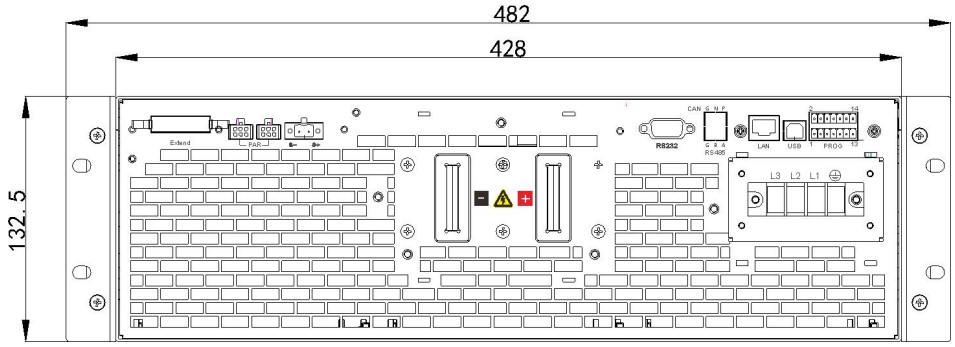


Figure 2 3U Chassis Rear Panel Dimension(mm)

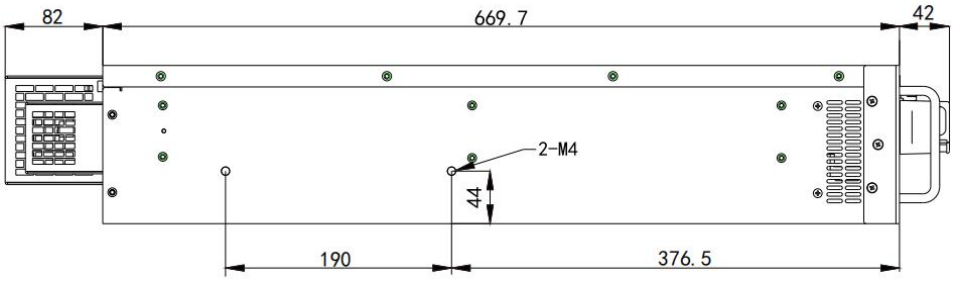


Figure 3 3U Chassis Side Dimension(mm)

3.3.3 Front Panel Introduction

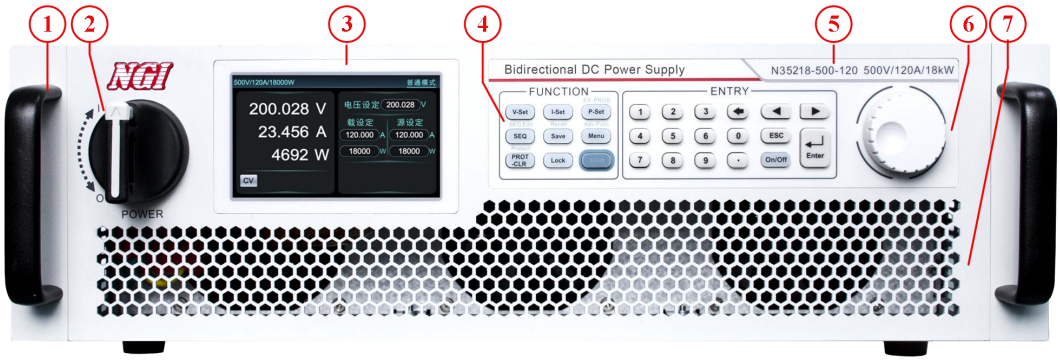


Figure 4 Front Panel

Table 3

Number	Name	Function
1	Handle	For installation and handling
2	Power switch	Power control
3	Screen	Displaying data
4	Buttons	Operation mode and parameter setting
5	Device model	Displaying model number
6	Knob	Operation mode and parameter setting
7	Air outlet	Exhaust outlet, cooling

3.3.4 Button & Knob

Users can control N35200 via button and knob.

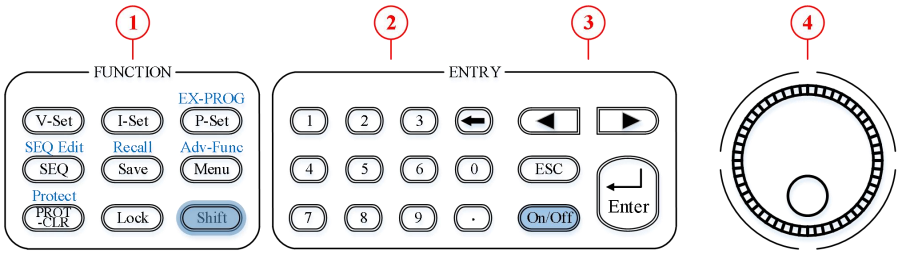


Figure 5 Button & Knob

Table 4

Number	Name

1	Function buttons
2	Numeric buttons
3	Left/right button, ESC button, On/Off button, Enter button
4	Knob

3.3.4.1 Function Button

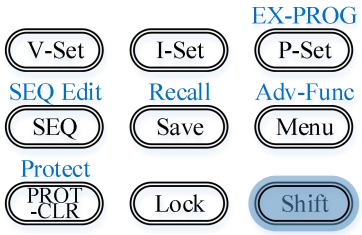


Figure 6 Function Button

Table 5

Button	Function
[V-Set]	To set output voltage
[I-Set]	To set output current for source and load mode
[P-Set]	To set output power for source and load mode
[SEQ]	To enter SEQ test interface
[Save]	To enter save interface
[Menu]	To enter the main menu
[PROT-CLR]	To clear the protection
[Lock]	To lock/unlock
[Shift]	Compound button
EX-PROG （[Shift]+[P-Set]）	To enter external programming
SEQ Edit （[Shift]+[SEQ]）	To enter SEQ Edit
Recall （[Shift]+[Save])	To enter recall interface
Adv-Func （[Shift]+[Menu]）	To enter advanced function interface

Protect （[Shift]+[PROT-CLR]）	To enter protection interface

3.3.4.2 Numeric Button

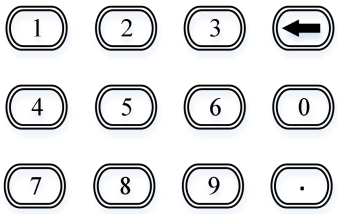


Figure 7 Numeric Button

Table 6

Button	Function
[0~9], [.]	To input digits
[⬅]	To delete

3.3.4.3 Left/Right Button, ESC Button, On/Off Button, Enter Button

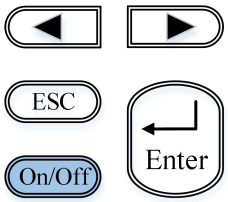


Figure 8 Left/Right Button, ESC Button, On/Off Button, Enter Button

Table 7

Button	Function
[←], [→]	1. To shift or select the required parameter 2. To control the cursor scrolling when setting parameter
[ESC]	To return to previous page
[Enter]	To enter the required parameter, confirm the input, exit from setting
[On/Off]	To turn on/off the output

3.3.4.4 Knob

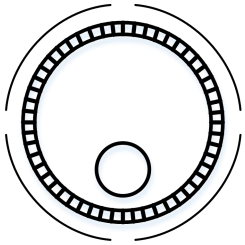
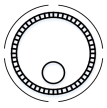


Figure 9 Knob

Table 8

Knob	Function
	By rotating: to select the required item, adjust the parameter By pressing: to enter the edit interface, confirm the input

3.3.5 Screen

N35200 series adopts a 4.3 inch LCD with resolution 800*480.

3.3.5.1 Test Interface

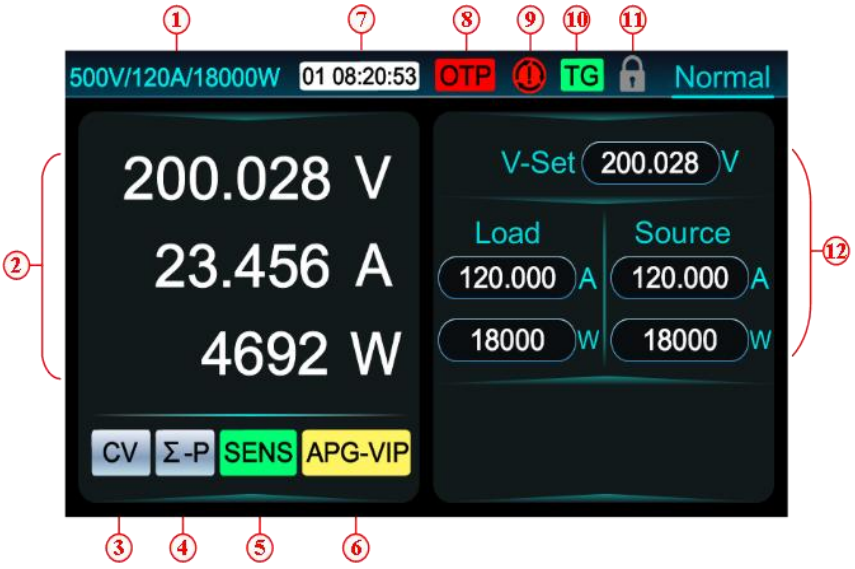


Figure 10 Test Interface

Table 9

Name	Number	Function
Device specification	①	Displaying specification of voltage, current and power

Readback area	②	Readback of voltage, current and power Users can press Shift +▶ or Shift + ◀ to switch parameters: power, loading time, Ah, kWh, resistance and temperature.
Status information area	③④⑤⑥	③ Output mode: Off/CV/CC/CP ④ Parallel status: Under parallel mode, Σ-P symbol will be displayed. There is no parallel symbol if the device is not under parallel mode. ⑤ Remote sense: Under remote sense, SENS symbol will be displayed. There is no sense symbol if the device is not under remote sense. ⑥ External programming: Symbol APG-VI stands for voltage & current programming. Symbol APG-VIP stands for voltage & current & power programming. There is no external programming symbol if the external programming is not activated.
Countdown area	⑦	When countdown is over one day, the format is DD HH:MM:SS. When countdown is within one day, the format is HH:MM:SS.
Warning area	⑧⑨	⑧ Protection warning: There will be corresponding symbol if protection happens, for example OTP (over temperature protection). ⑨ Emergency stop warning: The emergency stop symbol ⓫ will be displayed when emergency stop signal is triggered. The emergency stop symbol will disappear after the signal disappears and button PORT-CLR is pressed.

Operation information area	⑩⑪	⑩Control mode: TG stands for Toggle. HD stands for Hold. ⑪Symbol 🔒 will be displayed after button Lock is pressed. At this time, the buttons are invalid. Symbol 🔒 will disappear after button Lock is pressed again. At this time, the buttons are valid.
Parameter setting area	⑫	Users can press ◀or▶or rotate the knob to set the parameters.

3.3.5.2 Menu

Users can press [**Menu**] to enter the main menu, then press [←][→] or rotate knob to view the below items, press [**Enter**] to access the required item.

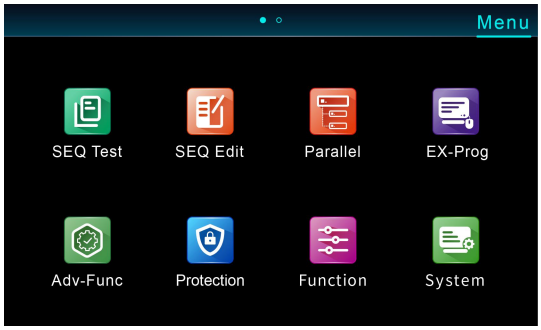


Figure 11 Menu Page One

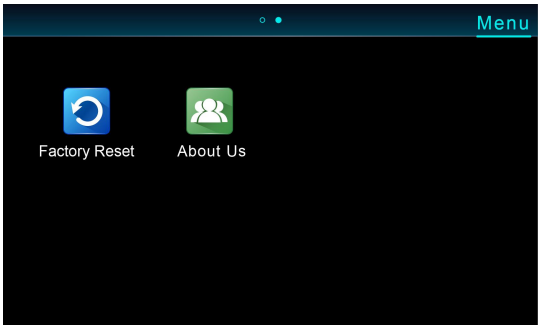


Figure 12 Menu Page Two

3.3.6 Rear Panel Introduction

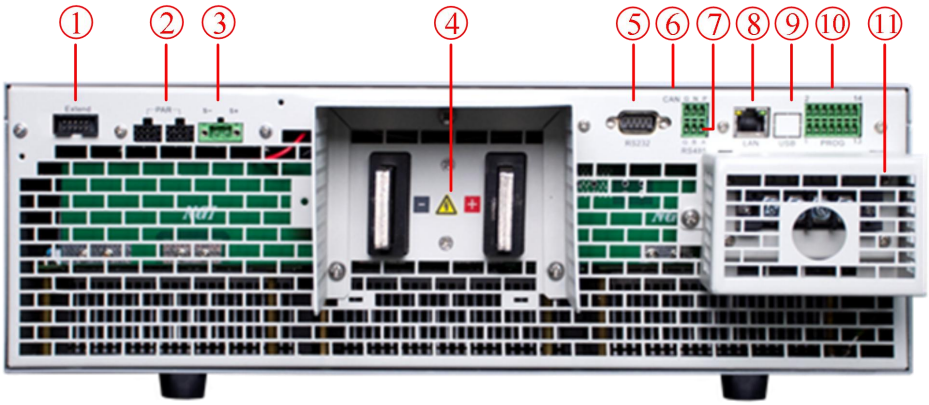
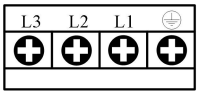


Figure 13 3U Rear Panel

Table 10

Number	Name	Icon	Definition
1	Extension interface	Extend	For power extension
2	Parallel interface	PAR	Master/slave parallel interface
3	Voltage sense interface	S- , S+	For voltage remote sense
4	Output interface	- +	DC power supply output
5	RS232 interface	RS232	Serial port, for remote control
6	CAN interface	CAN	Optional, for remote control
7	RS485 interface	RS485	Optional, for remote control
8	LAN port	LAN	For remote control
9	USB port	USB	Optional, USB serial port, for remote control
10	External programming interface	PROG	Voltage/current/power/status monitoring, trigger, emergency stop, etc.
11	AC power interface		Three phase, L1/L2/L3/grounding terminal

3.4 Installation

3.4.1 Package Contents and Accessories

After receiving N35200, 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 N35200 chassis is damaged or has abnormal operation, please contact our authorized distributor or TOYOTECH.

Table 11

N35200 Accessories	Quantity	Instructions
RS232 cable	1	For RS232 communication
Ethernet cable	1	For Ethernet connection
Pluggable connector(3.5mm-14Pin)	1	For external programming interface connection
Pluggable connector(5.08mm-2Pin)	1	For voltage remote sense interface connection
Handle	2	For installation and carrying
Screw M4*10	6	For fixing the handle
Factory test report	1	Test result before delivery
USB flash drive	1	Software, technical information, user manual

Notes

If any loss or damage, please contact our authorized distributor.

3.4.2 AC Input Connection

Notes for AC power input connection:

- Three phase input: 340VAC ~ 480VAC, 45Hz ~ 66Hz
- No phase sequence requirement for L1, L2, L3 terminal
- Reliable ground ⏚
- Please select the appropriate output wire according to the Recommended Wire Gauge Selection Table. Do not use thin wires to avoid overheating, which may cause danger.
- The power supply dissipates heat through air cooling. When installing, please ensure that the power supply and other objects maintain a gap of at least 20cm for air circulation.

3.4.3 Power-on Test

After N35200 is powered on, please check the device according to the following steps.

- Power-on test includes two parts: system self-test and output inspection.

1. System self-test

After the power cable is connected and power switch is pressed, N35200 will start self-inspection process. The following interface will be displayed.

Figure 14 System Self-test Interface

The following items will be checked.

①Check if the converter module works normally.

②Check if the calibration data are complete.

③Check if the file parameters are complete.

After all items passed, it will automatically enter application interface. If not passed, it will stay in the above interface. Please contact NGI for solution. Without affecting the use, users can press [**Enter**] to enter the application interface.

2. Output Inspection

- Output Voltage Inspection

Steps to verify N35200's basic voltage function without connecting to a load:

1. Press the power switch.
2. Make sure the output is in off state.

3. Make sure the output positive and negative polarities are open-circuited.

4. Set voltage to 5V.

5. Set source&load current to higher than 1A.

6. Turn on output.

7. Check if the readback voltage is close to 5V.

8. Change voltage setting and check if the voltage can be set from 0V to full range.

- Output Current Inspection

Steps to verify N35200's basic current function during output short-circuited:

1. Press the power switch.

2. Make sure the output is in off state.

3. Connect an insulated wire to short circuit the positive and negative polarities at the output of N35200. The wire used should be able to bear the maximum output current of N35200.

4. Set source&load current to 1A.

5. Set voltage to higher than 5V.

6. Turn on output.

7. Check if the readback current is close to 1A.

8. Change current setting and check if the current can be set from 0A to full range.

3.5 Connection

3.5.1 AC Input Connection

Warning: Please confirm the AC input power and connect to correct AC power. Wrong AC power may cause serious damage to the instrument.

3.5.1.1 Single Unit AC Input Connection

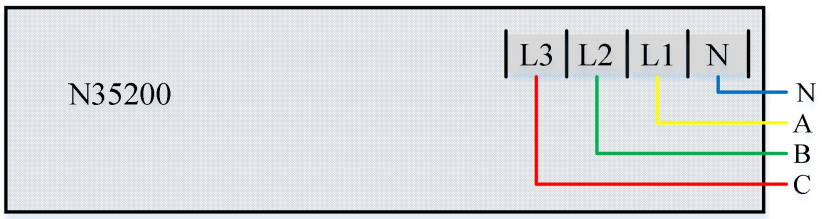


Figure 15 Single Unit AC Input Connection

3.5.1.2 Multiple Units AC Input Connection

When multiple 5kW, 6kW, 10kW, and 12kW units are connected to the grid simultaneously, it is recommended to distribute the access points in a balanced manner. As shown in the figure below, L1, L2 and L3 terminals of the three power supplies are respectively connected to ABC, BCA and ACB. When 15kW and above units are connected to the three-phase power grid, there is no need to consider the imbalance to the power grid.

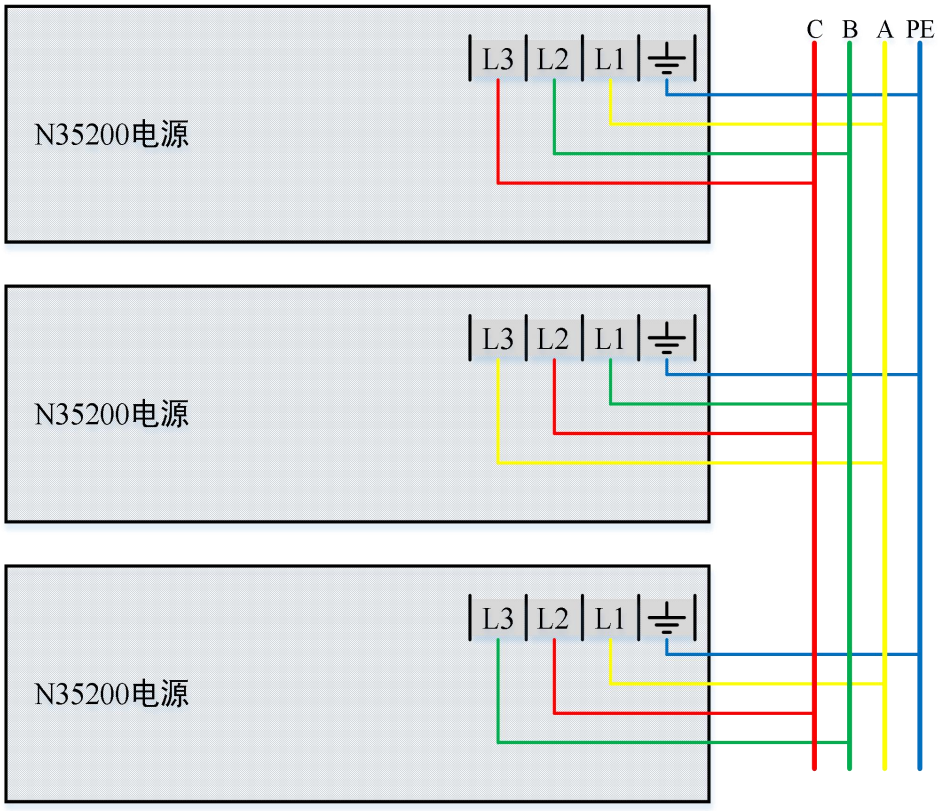


Figure 16 5kW/6kW/10kW/12kW Units AC Input Connection

3.5.2 DC Output Connection

The DC output connection is to connect the + and - copper bars on the rear panel of N35200 to the DUT, as shown in the figure below. When connecting, please pay attention to the wire diameter, length and polarity of the output wire, and avoid reverse polarity connection, which can burn out the DUT. Do not use wires with smaller diameter, which will affect measurement accuracy and cause overheating and danger. Please refer to the Recommended Wire Gauge Selection Table.

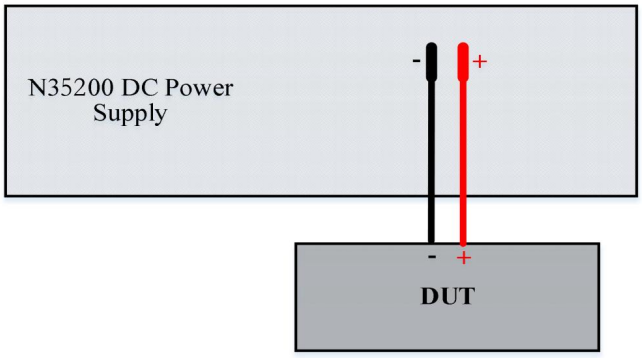


Figure 17 DC Output Connection

Table 12 Recommended Wire Gauge Selection Table

Model	Sectional Area	Temperature Conditions			
AWG	mm²	60℃	75℃	85℃	90℃
		Wire model: RUW, T , UF	Wire model: RHW, RH	Wire model: V, MI	Wire model: TA, TBS, SA, AV
		Rated Current (A)			
14	2.08	20	20	20	20
12	3.31	25	25	30	30
10	5.26	30	35	40	40
8	8.36	40	50	55	55
6	13.3	55	65	70	75
4	21.1	70	85	95	95
3	26.7	85	100	110	110

2	33.6	95	115	125	130
1	42.4	110	130	145	150
0	53.5	125	150	165	170
00	67.4	145	175	190	195
000	85	165	200	215	225
0000	107	195	230	250	260

3.5.3 Voltage Remote Sense Connection

When N35200 is working, due to the parasitic resistance of the wire, the voltage at the load input terminal will be lower than the voltage at N35200 output terminal after the current flows through the wire, which will affect the output accuracy of N35200. N35200 series supports remote sense to compensate the voltage drop.

When using remote sense, please connect S+ to load input+ and connect S- to load input-. After remote sense terminal is connected, SENS symbol will be displayed on the screen. If the sense wire falls off, only the compensation voltage will be lost, the power output will not be affected.

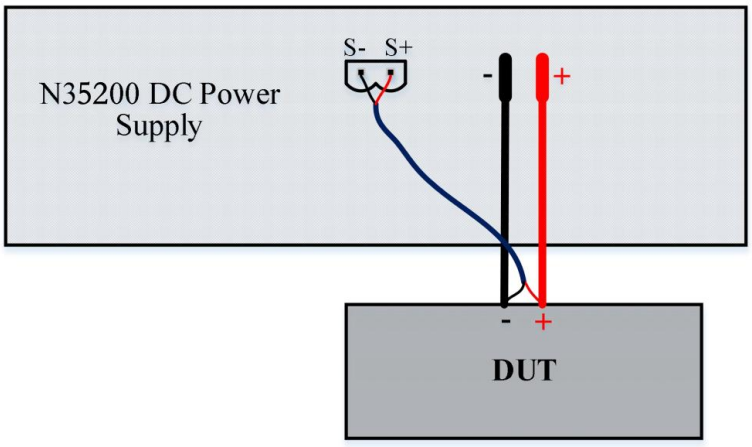


Figure 18 Voltage Remote Sense Connection

Note

1. The sense wires can be red and black wires with a cross-sectional area of 0.5mm² to 1mm². It is recommended the sense wire should be twisted.

2. Voltage compensation for models @ 80V is less than 1.5V. Voltage compensation for models above 80V is less than 5V.

3.5.4 Energy Feedback Connection

The energy feedback feature of N35200 series enables it to realize the load function while also returning the absorbed energy to the power grid without pollution. The below figure shows the connection mode. If the efficiency of "DC source device" in the figure is 90%, and the feedback efficiency of N35200 series is 93%, theoretically the user can save 84% of the electric energy.

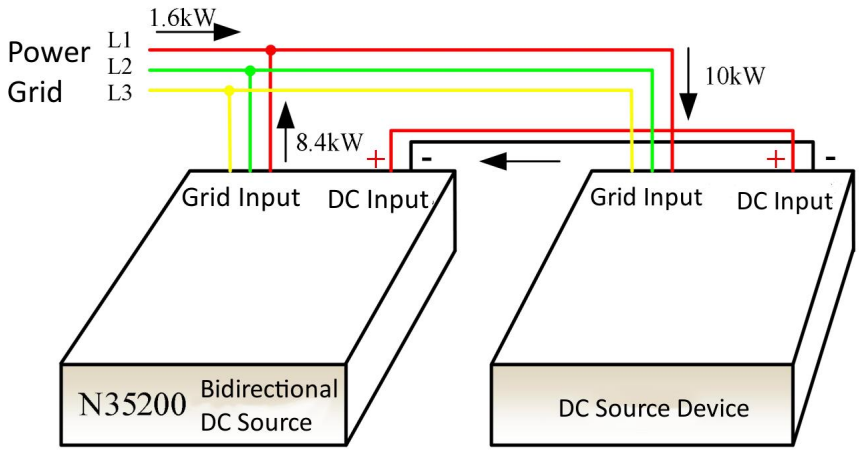


Figure 19 Electrical Energy Feedback Connection

3.5.5 Remote Operation

N35200 is equipped with two communication interfaces as standard: RS232 and LAN. It supports connecting to a computer through either a serial port cable or an Ethernet cable, and also supports multiple N35200s to be connected to one or more computers simultaneously through a network switch or router. Before communication, please make sure the cable connection is correct and the IP addresses of all N35200s are not duplicated.

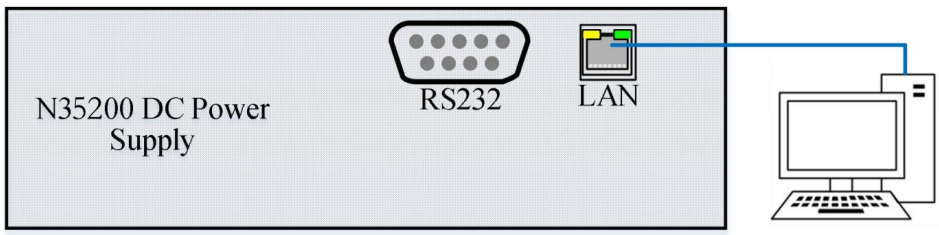


Figure 20 Single Device Connection Diagram

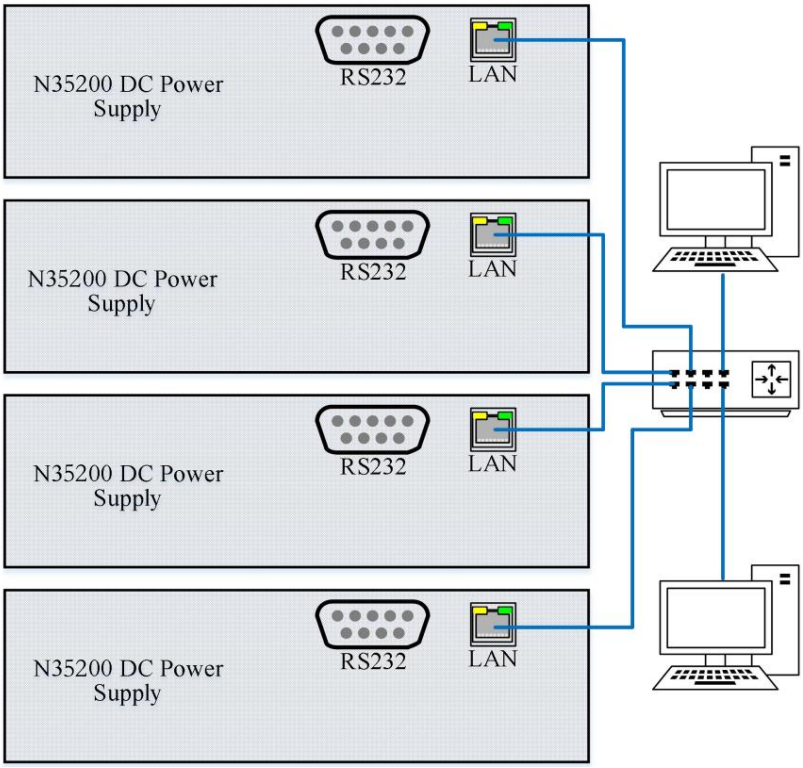


Figure 21 Multiple Devices Connection Diagram

Under remote control, the screen will be as below picture. To return to local operation, please press [**Enter**] button.

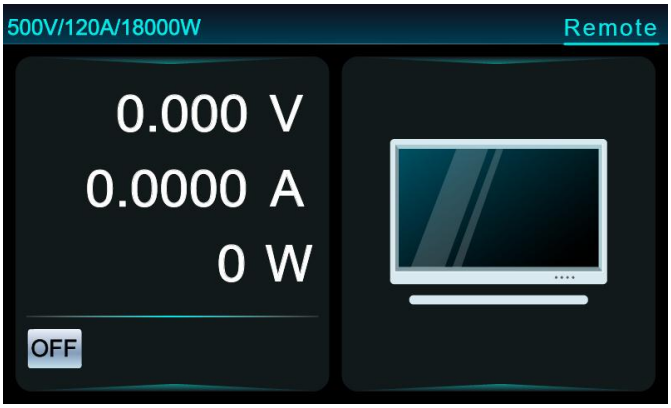


Figure 22 Remote Control Interface

3.5.6 LAN Port

LAN port is a default communication port for N35200. The Ethernet cable is a standard accessory.

Steps for remote control via LAN port:

1. Check if N35200 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 N35200 LAN port.
5. Check if the indicator light at LAN port on N35200: green light always on, orange light flashing.

Note

If the green light is always on and the orange light is flashing, it means the hardware network connection has been established. Otherwise, please check whether the computer LAN port works properly, and make sure the computer is turned on properly.

3.5.7 RS232 Interface

On the rear panel, there is a male DB-9 interface with 9 pins.

Table 13 RS232 Pin Definition

Pin	Definition
1	NC
2	RXD, receive data
3	TXD, transmit data
4	NC
5	GND, ground
6	NC
7	NC
8	NC
9	NC

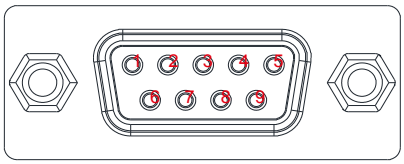


Figure 23 RS232 Interface

3.5.8 CAN/RS485 Interface

On the rear panel, there is a shared interface for CAN and RS485. RS485 is on the top. CAN is in the bottom.

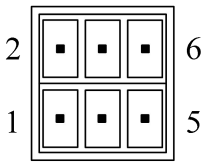


Figure 24 CAN/RS485 Interface

Table 14 CAN/RS485 Pin Definition

Pin	Name	Definition
1,2	GND	Reference ground
3	RS485-A	RS485 bus A terminal
4	CAN-P	CAN bus H terminal
5	RS485-B	RS485 bus B terminal
6	CAN-N	CAN bus L terminal

3.5.9 Programming Interface

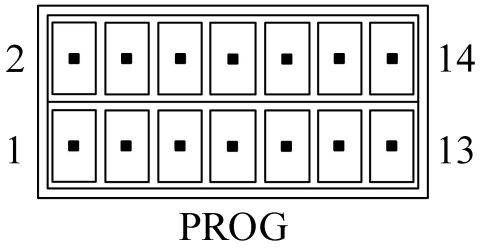


Figure 25 Programming Interface

Table 15 Pin Definition

Pin	Name	Definition
1	Mode	Operation mode output terminal, 5V TTL level. H:CC mode or CP mode, L:CV mode
2	Stop	Emergency stop signal input terminal, supporting empty node and 5V TTL level
3	Fault	Fault indication output signal terminal, 5V TTL level.

		H: failure, L: normal
4	On/Off	External control input terminal, supporting empty node and 5V TTL level. Active on falling edge or low level.
5,6,13	Reserve	Reserved
7,8	GND	Reference ground
9	IMON	Output current monitoring terminal, output range: default 0~10V, optional 0~5V
10	VMON	Output voltage monitoring terminal, output range: default 0~10V, optional 0~5V
11	P-Set	CP analog input, input range: default 0~10V, optional 0~5V
12	I-Set	CC analog input, input range: default 0~10V, optional 0~5V
14	V-Set	CV analog input, input range: default 0~10V, optional 0~5V

The external programming interface is electrically isolated from the positive and negative output terminals of N35200. When using the external programming interface, pin 7 and 8 are the reference ground for the external programming interface.

4 Operation

This chapter mainly describes the following functions of N35200.

- **Parameter Setting**
- **Output Control**
- **Normal**
- **SEQ**
- **RES**
- **RAMP**
- **CR Mode**
- **Charging Mode**
- **CC/CV Priority**
- **Discharging Mode**
- **Limit Parameter**
- **External Programming**
- **Parallel**
- **Protection**
- **Voltage Quick Zero**
- **Poweroff Memory**
- **Factory Reset**
- **Communication**

4.1 Parameter Setting

4.1.1 Numeric Input

Numeric input is used to input digit, such as voltage, slew rate, protection threshold, IP address, etc.

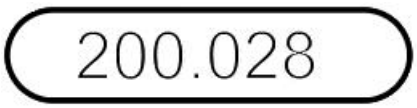


Figure 26 Numeric Edit

Steps for numeric input:

1. Press [◀] [▶] or rotate the knob to move the cursor to the numeric input box.

2. Press [**Enter**] or the knob. The input box is now editable.
3. Press numeric buttons to input the value or press [◀] [▶] to move the cursor and rotate the knob to adjust the numeric.
4. It will take effect immediately after the value is changed.
5. Press [**Enter**] or [**ESC**] or the knob to exit.

Warning: The value input should be within the rated range or upper limit(Max) & lower limit(Min).

4.1.2 Selection Operation

Selection operation is used to select parameters, such as communication protocol, external control mode, master/slave option, etc.

Figure 27 Selection Operation

Steps for selection operation:
1. Press [◀] [▶] or rotate the knob to move the cursor to the selection box.
2. Press [**Enter**] or the knob. The selection box is now editable.
3. Press [◀] [▶] or rotate the knob to select the required option.
4. It will take effect immediately after the option is selected.
5. Press [**Enter**] or [**ESC**] or the knob to exit.

4.2 On/Off Control

[**On/Off**] button on the front panel is used to turn on and off the output of N35200. The button has a backlight display. It will be lighted when the output is on, and it will be off when the output is off. After pressing [**On/Off**] button, users can judge whether N35200 output is turned on by observing the readback value and status information in the readback area and status display area.

4.3 Normal Mode

After the device is turned on, it enters **Normal** mode by default. Users can also enter **Normal** mode by pressing [**V-Set**], [**I-Set**], [**P-Set**] or [**ESC**] buttons on the front panel.

Figure 28 Normal Interface

4.3.1 Source&Load State

N35200 series products have two operating states: source and load. When used as a power supply, the energy provided by the device is in the source mode, and the current and power readback are positive. When used as a load, the device absorbs external energy and returns to the power grid in the load mode. In this case, the current and power readback are negative. The conversion of the source and load state is determined by the set voltage of the power supply and the external voltage. After the bidirectional power supply is turned on, when the set voltage of the power supply is lower than the external voltage, the device is in the load mode, otherwise it is the source mode.

4.3.2 Operation Mode

N35200 has three operation modes, constant voltage (CV), constant current (CC), and constant power (CP). When N35200 output is turned on, the status display area will

display the present output mode.

CV: When the actual output source(load) current is less than the source(load) current setting value and the actual output source(load) power is less than the source(load) power setting value, the power supply operates in source(load) CV mode, and the voltage outputs according to the setting value.

CC: When the actual output source(load) current reaches the source(load) current setting value, the power supply operates in source(load) CC mode. At this time, the output source(load)current outputs according to the current setting value.

CP: When the actual output source(load) power reaches the source(load) power setting value, the power supply operates in source(load) CP mode. At this time, the output source(load) power outputs according to the power setting value.

4.3.3 Voltage/Current Slew Rate

N35200 supports voltage slew rate and current slew rate settings. Users can set the required slew rate to meet the test requirement of DUT. The slew rate can be set under [**Function**], as shown in the figure below.

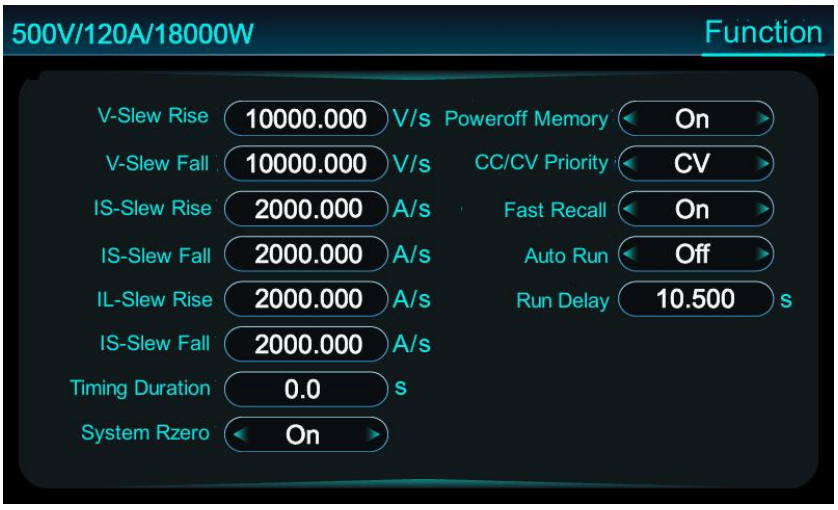


Figure 29 Function

The highest settable slew rate is related to the specification and model. Please refer to the technical data sheet in the last chapter.

4.3.4 Save/Recall

N35200 supports saving and recalling test parameters in normal mode. It can save 20 groups of test parameters for users to recall quickly. Each group includes five parameters: voltage setting, current setting, power setting, voltage slew rate, and current slew rate. This function helps to improve the test efficiency. This function is only valid for normal mode. Before using, please enable the fast recall function under [**Function**].

To save the present parameters, please press [**Save**] button in [**Normal**] mode to enter the save interface. As shown in the figure below, it prompts "Please select". After inputting the storage location, it prompts "Please press Save". At this time, please press [**Save**] again to save the present parameters to the selected location, and the interface will simultaneously display "Saved successfully" and automatically jump back to [**Normal**] interface.

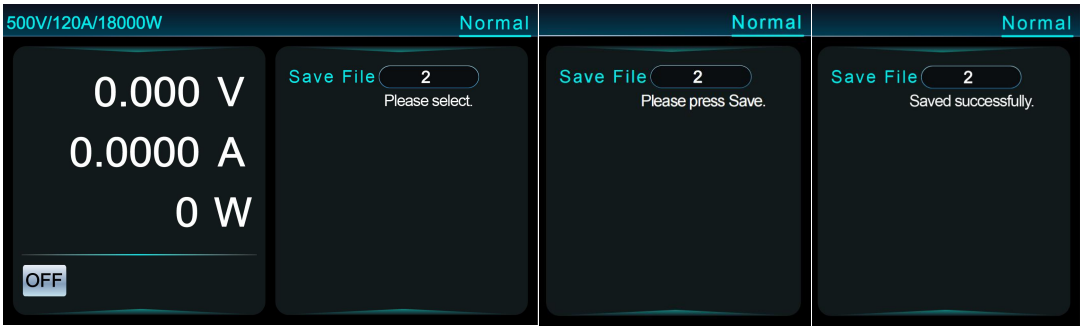


Figure 30 Save Interface

To recall a certain group of parameters, please press [**Shift**] first and then press [**Save**] to enter the recall interface. As shown in the figure below, it prompts "Please select".

After inputting the recall location, it prompts "Please press Recall". At this time, please press [**Recall**]. It will update the parameters of the selected position to the set value, and the interface will simultaneously display "Recalled successfully" and automatically jump back to [**Normal**] interface.

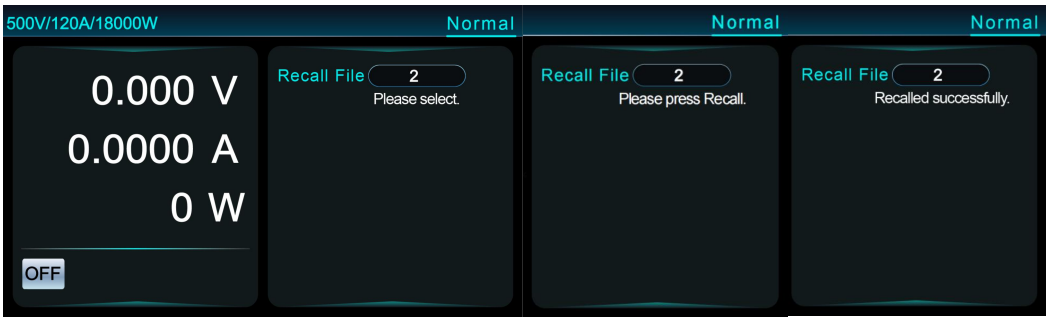


Figure 31 Fast Recall

4.3.5 Timing Output

N35200 supports timing output function. The timing duration can be set up to a maximum of 999999s s (equivalent to 11.57 days). This function can be set under [**Function**],it will be disabled when setting to 0. After the function is enabled, the countdown time will be displayed on top of [**Normal**] interface. The time format is DD HH:MM:SS, which respectively represent day, hour, minute, and second. If the output is turned off, the countdown will be aborted.

Figure 32 Countdown Interface

4.3.6 Power-on Auto Run

N35200 series power supply provides the function of automatic operation on startup. Enable, disable, run delay of this function can be set under [**Function**]. When this function is enabled, N35200 starts timing after entering [**Normal**] when N35200 is switched on. When the timing reaches "Auto Run Delay", N35200 automatically starts output. The value of Auto Run Delay ranges from 3s to 60s.

4.4 SEQ Mode

SEQ mode includes SEQ Test function and SEQ Edit interface.

4.4.1 SEQ Test

SEQ Test allows users to select the sequence file to be run. SEQ test (sequence test function) supports simulation of complex voltage & current waveform, which is frequently used for automotive electronics test, engine start-up test, etc. When the sequence file runs, the highest voltage and current slew rates are used by default. Please press [**SEQ**] button to enter [**SEQ Test**].

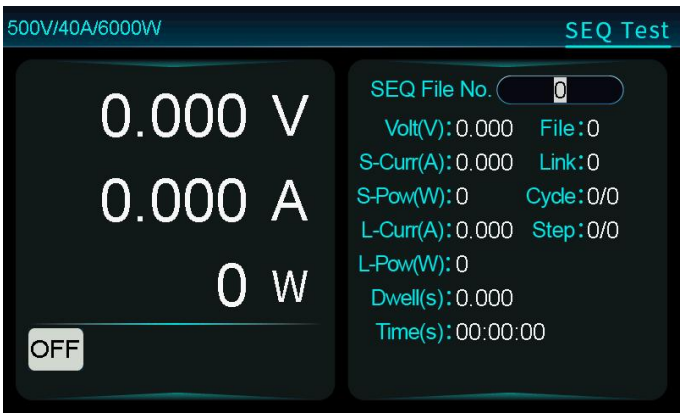


Figure 33 SEQ Test

Under [**SEQ Test**], **SEQ File No.** is used to select the running file. N35200 provides 10 sequence files, supports cycle running of the same sequence file, and supports linking to the next file. Each sequence file supports up to 100 running steps. **Volt(V), S-Curr(A), S-Pow(W) , L-Curr(A), L-Pow(W)and Dwell(s)** display the setting of present step. **File** displays the running file number. **Link** displays the file number to be linked. The values of **Cycle** and **Step** are separated by /. The left and right values of **Cycle** represent the cycles already operated and the total cycles respectively. The left and right values of **Step** represent the current running step number and the total steps of the running file respectively.

After selecting the sequence file, please press [**On/Off**] button to start sequence test. When the running cycles of all test steps in the sequence file reach the preset cycles, N35200 will automatically turn off the output and stop the sequence test.

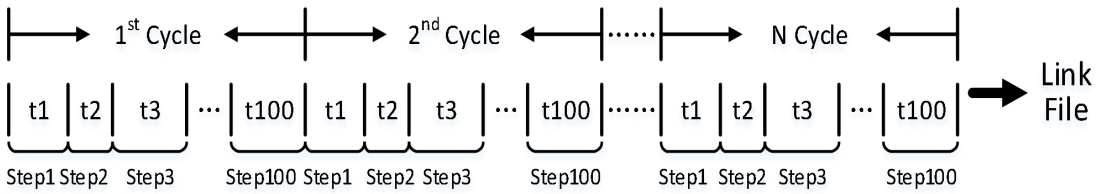


Figure 34 Sequence Operation Principle

4.4.2 SEQ Edit

Please press [**Shift**] first and then[**SEQ**] to enter **SEQ Edit**.

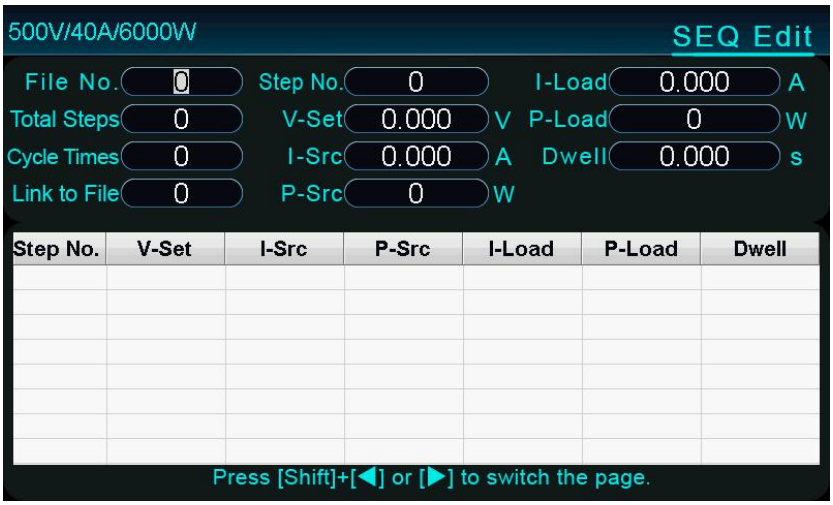


Figure 35 SEQ Edit

The top side of the interface is the sequence file editing area. N35200 provides 10 sequence files. Each file supports up to 100 running steps.

The table on bottom side of the interface displays the currently edited file. A single page can display eight steps. Users can switch pages by pressing [**Shift**] first, and then pressing [◀] or [▶].

Table 16

No.	Parameter	Function
1	File No.	To set the sequence file number, range 1~10. When it is modified, number 2 to 11 and data in table will be updated accordingly.
2	Total Steps	To set the total test steps for the SEQ file, range 1~100
3	Cycle Times	To set the number of cycles for the file under edit, range 0～60000. Zero means continuous cycle.
4	Link to File	Link to the required file after the present file is completed, range 0～10. Zero means no link.
5	Step No.	To set the test step number, range 1～100. When it is modified, number 6 to 11 and data in table will be updated accordingly.
6	V-Set	To set the output voltage for the present step
7	I-Src	To set source current for the present step
8	P-Src	To set source power for the present step

9	I-Load	To set load current for the present step
10	P-Load	To set load power for the present step
11	Dwell	To set single step delay time, range 0.001～99999s

4.5 RES

The simulated internal resistance test function of N35200 can be used to simulate a battery offering power to test object. Please select **Adv-Func** in the menu, and then select **RES** to enter internal resistance simulation test.

Figure 36 RES Interface

Due to the existence of internal resistance in real batteries, the voltage will decrease with the increase of current when offering power to test object. The output of battery meets the following formula.

$$Vo = Vs - Io \times Ri$$

Vo is the actual output voltage. Vs is the open circuit voltage. Io is the actual output current. Ri is internal resistance.

Right side of [**RES**] interface provides four settable parameters: **Voc**, **I-Max**, **P-Max** and **R-Set**. **Voc** is the open circuit voltage of battery, corresponding to Vs in the above formula. **I-Max** and **P-Max** are the allowable maximum output current and maximum output power respectively, and the actual value depends on the load condition. **R-Set**

is the simulated internal resistance of battery, which corresponds to Ri in the above formula.

4.6 RAMP

N35200 provides **RAMP** test function. Please select **Adv-Func** in the menu, and then select **RAMP** to enter RAMP test.

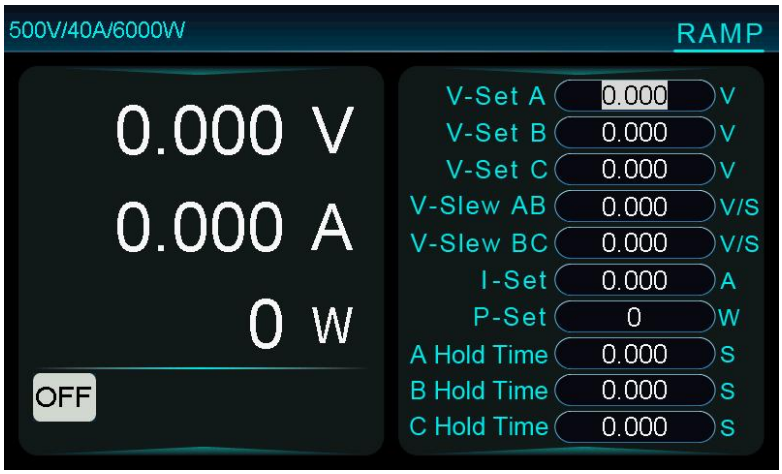


Figure 37 RAMP

As shown in the figure below, the starting point A, midpoint B and end point C form three sections of platform and two sections of slew. The voltage value and holding time of each platform, as well as the slew rate of AB and BC segments can be set. The minimum hold time can be 0s and the maximum can be 9999.999s, which can flexibly meet various application scenarios. After N35200 starts output, it controls the voltage output based on the voltage rise slew set in [**Function**] interface. When the output voltage reaches **V-Set A**, it is maintained for a period of time. The holding time is set by **A Hold Time**. After the holding time is reached, N35200 controls the voltage output according **V-Slew AB**. When **V-Set B** is reached, **B Hold Time** remains unchanged, and then the voltage output is controlled according to **V-Slew BC**. When

V-Set C is reached, **C Hold Time** remains unchanged, and finally the output is automatically turned off.

I-Set and **P-Set** are used to limit the output current and output power of N35200. When using **RAMP** function, it is recommended to set **I-Set** and **P-Set** to the maximum value to avoid that the voltage cannot be output according to the preset value and preset slew rate after entering CC or CP mode.

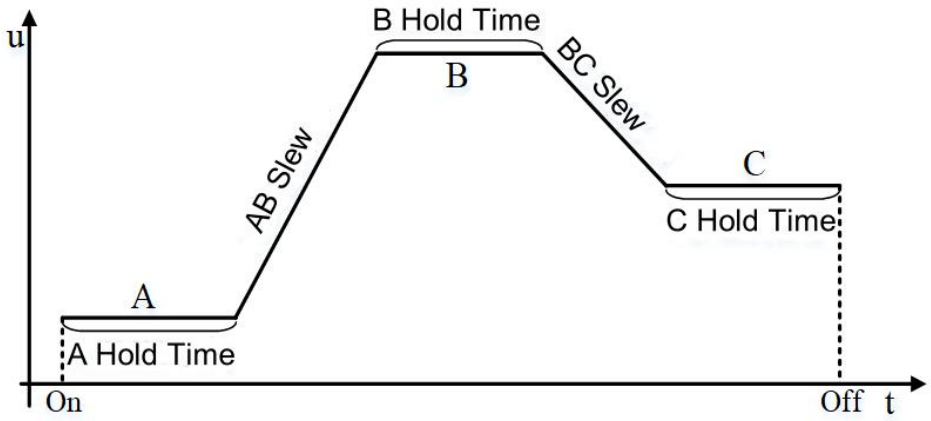


Figure 38 RAMP

4.7 Constant Resistance Mode(CR)

N35200 series can not only achieve constant voltage, constant current, constant power, but also work in constant resistance mode. Please select **Adv-Func** in the menu, and then select **CR** to enter CR mode.

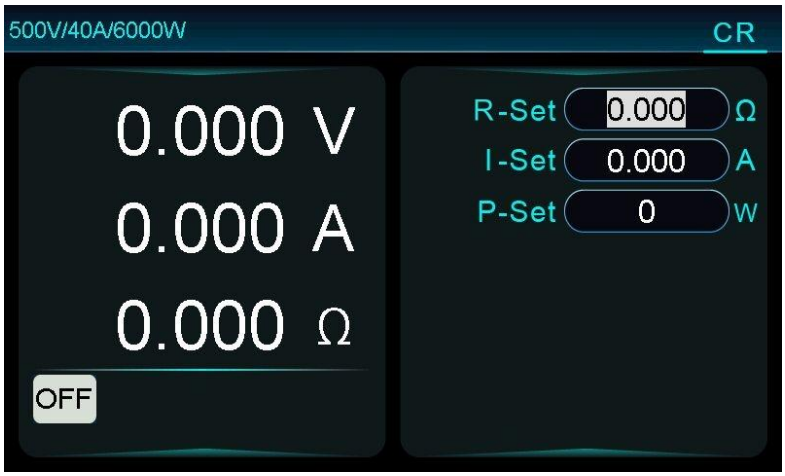


Figure 39 CR Interface

The setting area on the right side of the interface provides three configurable parameters: **R-Set**, **I-Set** and **P-Set**. The configurable range of **R-Set** depends on the specifications and models. For details, see Chapter 6 Main Technical Data. **I-Set** is the current limit value in CR mode. **P-Set** is the power limit value in CR mode.

4.8 Charge Mode

N35200 series can be used to conduct charging test for batteries and super-capacity devices under DC source mode. Please select **Adv-Func** in the menu, and then select **Charge** to enter Charge mode.

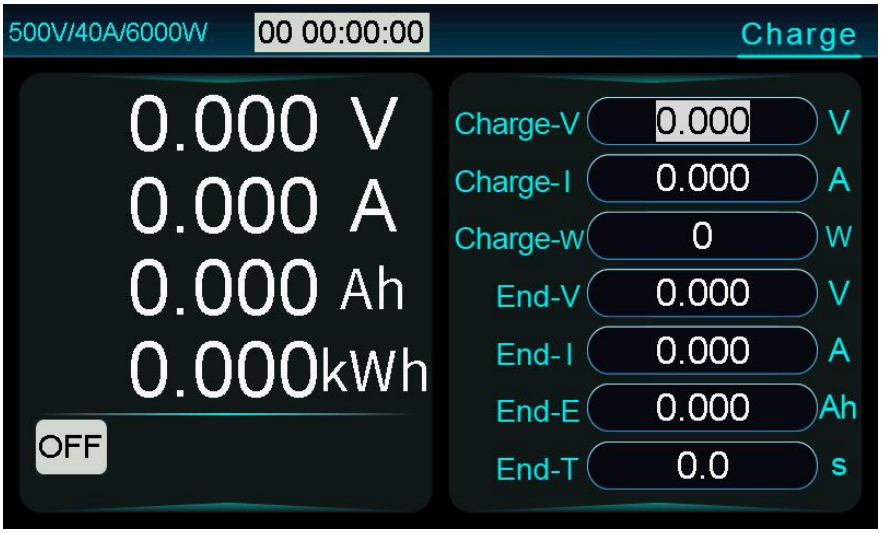


Figure 40 Charge Mode

Readback voltage, readback current, readback electric quantity, and readback energy are shown on the left side of the interface. Users can shift the readback energy to other readback items by first pressing [**Shift**] and then pressing [▸]. The charging time is shown in the top of the interface.

Users can set charging parameters on the right of the interface.

Table 17

No.	Parameter	Description

1	Charge-V	To set charge voltage. Range：0～Max.voltage. The default value is 0.
2	Charge-I	To set charge current. Range：0～Max.current. The default value is 0.
3	Charge-W	To set charge power. Range：0～Max.Power. The default value is 0.
4	End-V	When the actual voltage increases to **End-V**, N35200 automatically shuts off the output. The value ranges from 0 to the maximum voltage. 0 indicates that the judgment is disabled. The default value is 0.
5	End-I	When the actual current falls to **End-I**, N35200 automatically shuts off the output. The value ranges from 0 to the maximum current. 0 indicates that the judgment is disabled. The default value is 0.
6	End-E	N35200 will automatically shut off the output when the accumulated charging electric quantity increases to **End-E**. The value ranges from 0.000 to 999999Ah.0 indicates that the judgment is disabled. The default value is 0.
7	End-T	N35200 automatically shuts off the output when the charging accumulated time reaches **End-T**. The value ranges from 0 to 360000s. 0 indicates that the judgment is disabled. The default value is 0.

When any of End-V, End-I, End-E, End-T reaches the cut-off condition, the charge will be completed. When the charging function is restarted, the charging electric quantity and charging time will be reset and accumulated again.

4.9 Discharge Mode

N35200 series can perform discharge test for batteries and super-capacity devices under DC load mode. Please select **Adv-Func** in the menu, and then select **Discharge** to enter Discharge mode.

Figure 41 Discharge Mode

Readback voltage, readback current, readback electric quantity, and readback energy are shown on the left side of the interface.Users can shift the readback energy to other readback items by first pressing [**Shift**] and then pressing [▸]. The discharging time is shown in the top of the interface.

Users can set discharge parameters on the right of the interface.

No.	Parameter	Description
1	Discharge-I	Range：0～Max.current. The default value is 0.
2	Discharge-W	Range：0～Max.power. The default value is 0.
3	End-V	When the actual voltage decreases to **End-V**, N35200 automatically shuts off the output. The value ranges from 0 to the maximum voltage. 0 indicates that the judgment is disabled.
4	End-E	N35200 will automatically shut off the output when the accumulated discharging electric quantity increases to **End-E**. The value ranges from 0.000 to 999999Ah. 0 indicates that the judgment is disabled.
5	End-T	N35200 automatically shuts off the output when the discharging accumulated time reaches **End-T**. The value ranges from 0 to 360000s. 0 indicates that the judgment is disabled.

4.10 CC/CV Priority

If the test object is a capacitive or inductive load, there may be a current or voltage spike at the moment the test starts. To solve this problem, N35200 is developed with CC priority and CV priority selection function, which can force the power supply to run in CC mode or CV mode when the output is turned on. The output performance of CC priority and CV priority are shown in the following two figures respectively.

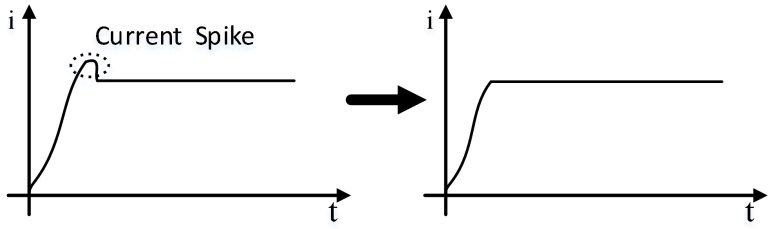


Figure 42 CC Priority

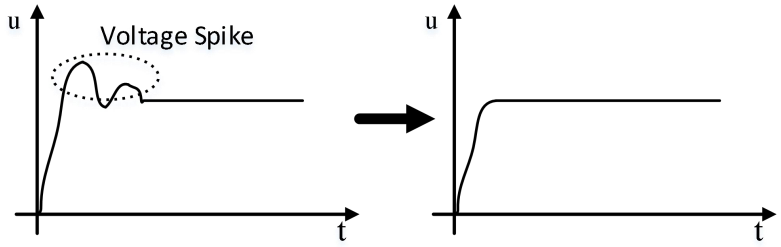


Figure 43 CV Priority

CC/CV Priority can be set under [**Function**].

4.11 External Programming

4.11.1 Analog Programming

N35200 supports external analog programming function of voltage, source(load) current and source(load) power. In parallel mode, the master device programming function is effective for the whole devices. The output of N35200 can be controlled by simulating the set value through an external DC voltage signal. The output changes with the change of the external input volume. The two are directly proportional. When external programming is turned on, the voltage, current and power settings on the LCD screen are invalid. The sampling rate of voltage, current and power programming is 2000 points/s. The relationship between input and output is shown in the figure below.

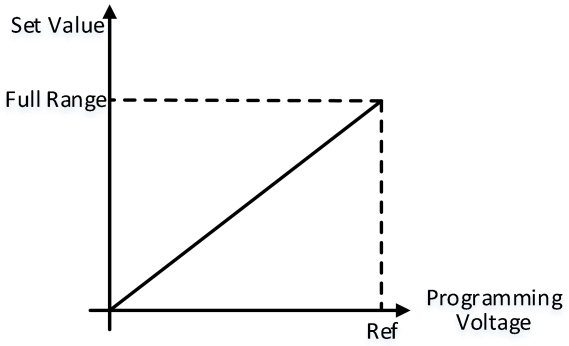


Figure 44 Input & Output Relationship of External Analog Programming

Voltage, current and power programming can be set under [**EX-Prog**] interface, as shown in the figure below. After the external programming is turned on, the interface will display information APG-XXX. If the voltage programming is enabled, the interface will display APG-V. If one of the source current and load current programming is enabled or at the same time, the interface will display APG-I. If one of the source power and load power programming is enabled or at the same time, the interface will display APG-P. If the voltage and power programming is enabled, the interface will display APG-VP. If all three are enabled, the interface will display APG-VIP.

N35200 provides the analog input function of voltage and current, which is effective after the power supply enables the external programming. Analog input ports of 0 to 5V or 0 to 10V correspond to the 0 to rated range in the DC source mode. It also corresponds to the 0 to rated range in load mode.

Figure 45 External Programming

4.11.2 Output Monitoring

N35200 provides analog monitoring function of output voltage and output current. This function is always valid after N35200 is turned on. The rate can reach up to 2000

points/s. Output voltage 0~rated value corresponds to monitoring output port 0~10V or 0~5V. Source/load current 0~rated value corresponds to monitoring output port 0~10V or 0~5V.

NOTICE

Monitoring current only reflects the absolute value of the current, not the direction of the current.

The monitoring output signal can be selected from 5V or 10V range.

4.11.3 Output Mode Monitoring

N35200 has an output mode signal terminal. This terminal outputs 5V TTL level signal. Low level indicates N35200 is working in CV mode. High level indicates N35200 is working in CC or CP mode.

4.11.4 Fault Indication Monitoring

N35200 has a fault indication signal terminal. This terminal outputs 5V TTL level signal. Low level indicates N35200 is working normally. High level indicates N35200 is abnormal or has been protected and the protection has not been cleared.

4.11.5 On/Off External Control

N35200 provides an input terminal for trigger signal. This terminal can be connected to a physical switch or a 0~5V signal source, and the low level is active. Closed or 0V is low level. Open or 5V is high level. The response time is about 20ms. After the input terminal receives valid input, N35200 will respond according to the external control mode. The external control mode can be set under [**EX-Prog**]. There are three

options: Off, Toggle and Hold.

Off: It ignores the input signal and does not respond.

Toggle: As an output control signal, the input terminal detects a valid low-level pulse, and then switches the ON and OFF states once. The operation information prompt is TG.

Hold: As an output switch control signal, when the input terminal is low level, N35200 output is turned on. When it is high level, N35200 output is turned off. The operation information prompt is HD.

4.12 Limit Parameter

N35200 provides settable upper(Max) and lower(Min) limits for voltage, current and power. The setting value can only be set within the allowable upper and lower limits. Normally, the setting value range is 0~full scale. Reducing the upper and lower limits is equivalent to reducing the settable range of setting value. This function has the advantage of protecting test objects. If the limit parameter is set to 0, the limit will be canceled.

If the setting value is less than the lower limit, the setting value will be automatically adjusted to the lower limit and take effect immediately. Conversely, if the setting value is greater than the upper limit, the setting value will be automatically adjusted to the upper limit and take effect immediately. The limit parameters can be set under [**Protection**]. Users can press [**Shift**] first and then press [**PROT-CLR**] or enter [**Protection**] from the menu.

Figure 46 Protection

Under [**Protection**], after the upper and lower limit of voltage or current or power is changed, N35200 will automatically check whether the setting value is within the allowable range. If it is not within the allowable range, it will be automatically changed to upper or lower limit. Users can observe the changed setting value by returning to the test page.

4.13 Protection Alarm

N35200 has multiple protection and alarm functions, including overvoltage, overcurrent, overpower, undervoltage, overtemperature, external communication timeout, and emergency stop, anti-island protection. Partial protection parameters can be set under [**Protection**].

After a protection alarm occurs, N35200 will immediately turn off the output and display the protection in the alarm area of the screen. At the same time, the buzzer sounds three consecutive alarms. By pressing [**PROT-CLR**] button, the protection state and protection alarm can be cleared. N35200 can restart output.

4.13.1 Over Voltage Protection

Overvoltage protection includes hardware protection and software protection. The hardware overvoltage protection threshold is fixed at 105% of rated voltage. The corresponding alarm is OV.

The threshold of software overvoltage protection can be set. Threshold 0 is considered to close protection. When the threshold is not 0 and the output voltage exceeds the set threshold, the software overvoltage protection will be triggered, and the screen will prompt OVP.

4.13.2 Over Current Protection

Overcurrent protection includes hardware protection and software protection. The hardware overcurrent protection threshold is fixed at 105% of rated current. The corresponding alarm is OC.

The threshold of software overcurrent protection can be set. Threshold 0 is considered to close protection. When the threshold is not 0 and the output current exceeds the set threshold, the software overcurrent protection will be triggered, and the screen will prompt OCP.

4.13.3 Over Power Protection

Overpower protection includes hardware protection and software protection. The hardware overpower protection threshold is fixed at 105% of rated power. The corresponding alarm is OP.

The threshold of software overpower protection can be set. Threshold 0 is considered to close protection. When the threshold is not 0 and the output power exceeds the set threshold, the software overpower protection will be triggered, and the screen will prompt OPP.

4.13.4 Under Voltage Protection

N35200 has software undervoltage protection. The threshold of undervoltage protection can be set. Threshold 0 is considered to close protection. When the threshold is not 0 and the output voltage is below the set threshold, the software undervoltage protection will be triggered, and the screen will prompt LVP.

4.13.5 Over Temperature Protection

When the ambient temperature of N35200 is too high or the ventilation is not good, the over-temperature protection will be triggered. The screen will prompt OTP. The over-temperature protection threshold has been solidified in the device. No manual setup is required.

4.13.6 Emergency Stop

N35200 provides an input terminal for emergency stop. This terminal can be connected to a passive physical switch or a 0~5V signal source, and the low level is active. Closed or 0V is low level. Open or 5V is high level. After the emergency stop occurs, N35200 immediately turns off the output. The interface displays alarm synchronously. When the emergency stop signal disappears and [**PROT-CLR**] button is pressed, the emergency stop alarm can be cleared. At this time, N35200 can restart output.

4.13.7 Module Failure

When N35200 power module fails or the electricity is cut off, N35200 will stop output and display MF in the alarm area.

4.13.8 Anti-island protection

When power failure, overvoltage, undervoltage, underfrequency, overfrequency and other phenomena occur in the power grid, N35200 will immediately trigger protection and stop working to prevent the occurrence of power grid islands, protect personnel safety and equipment stability.

4.14 Parallel

N35200 supports parallel connection of 10 devices of the same specification, which can be controlled and read back simultaneously through the shared bus PAR.

4.14.1 Parallel Connection

The master-slave parallel function only supports connection of devices of the same specification. Wiring is shown in the figure below. Corresponding settings should be made for each power supply to realize master-slave parallel function. If voltage remote sense is required, it is necessary to connect the voltage remote sense terminals S+ and S- of the master to the compensation point.

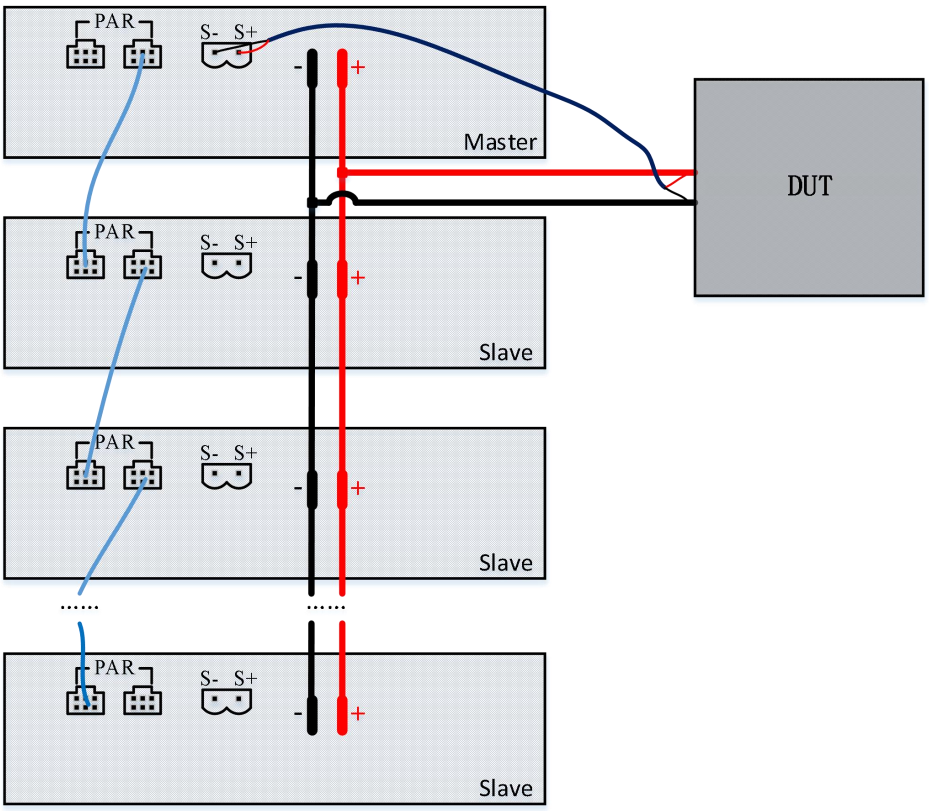


Figure 47 Parallel Connection Diagram

4.14.2 Parallel Setting

Users can enter [**Parallel**] interface from the menu. In parallel application, the slave should be configured first and then the master to avoid communication failure of the master. Options of [**Master/Slave**] are Master, Slave1 or Slave2, etc. There can only be one master. There can be multiple slaves. However, the role of the slave cannot be repeated, and must be set in ascending order. If there is only one slave, the slave number must be set to Slave1. When there are two slaves, one of them must be set as Slave1, the other must be set as Slave2, and so on, otherwise it will cause communication failure.

[**Slave Number**] is used to set the number of slaves, which must be consistent with the actual situation, otherwise the power and current readback of the master will be

inaccurate. [**Control**] is used to enable or disable the parallel function. [**Slave Number**] and [**Control**] are only displayed when [**Master/Slave**] is set to master. If set to slave, the two options will be hidden automatically, as shown in the figure below.

Figure 48 Parallel Interface

Figure 49 Parallel Interface(Slave)

Note

When multiple devices are set as master and the control function is turned on, the parallel operation will fail.

4.14.3 Parallel Operation

After the master and slave are paralleled, the operation is like a single machine. Users only need to operate the master to control the entire unit. The master test interface displays the setting parameters and readback values of the entire unit. The slave displays the readback value of itself, as shown in the figure below.

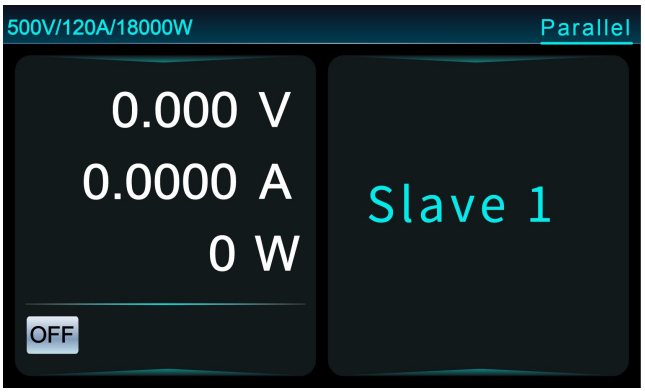


Figure 50 Slave Interface

When any device is protected, the system will automatically turn off the output of all devices. The slave displays the error information. The master displays the master error information and the faulty slave number. If only the master is protected, it is necessary to press [**PROT-CLR**] button on the master. But if the slave is protected, it is necessary to press [**PROT-CLR**] button on both the corresponding slave and the master to clear the fault. The following table lists the protection and fault conditions that may occur in parallel.

Table 18

No.	Error Information	Description
1	Red ∑-P showed on the master	Parallel communication is abnormal.
2	SP01-SP09	Indicating the faulty slave number

Warning

When the device is set as a slave, the original protection parameters will be canceled.

4.15 Voltage Quick Zero

When the output of conventional power products is turned off, the output port voltage takes a long time to discharge below the safe voltage due to the large

capacity capacitance inside. To speed up the discharge process,N35200 provides a voltage fast zeroing function, which reduces the voltage amplitude below the safe voltage in a few milliseconds. This function is enabled or disabled in [**Function**] and is enabled by default.

4.16 Poweroff Memory

N35200 provides poweroff memory function. After this function is enabled, when N35200 is powered on, the parameters at the last shutdown will be restored. Otherwise it will be initialized to default parameters.

The poweroff memory function can be turned on or off under [**Function**]. It is enabled by default.

4.17 Factory Reset

Users can enter **Factory Reset** from the menu.

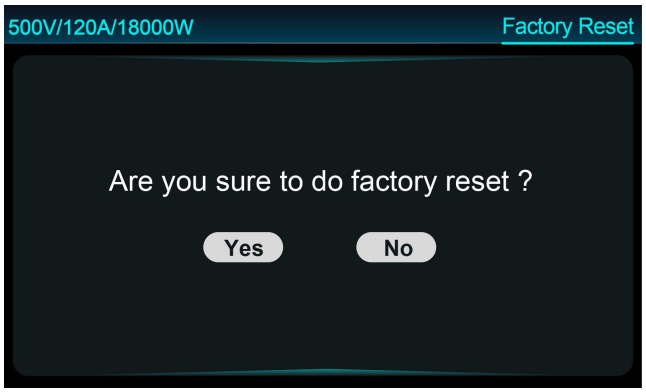


Figure 51 Factory Reset

In this interface, by pressing [**Enter**] button or the knob to select **Yes**, N35200 parameters will be restored to factory state. At the same time, the top of interface shows Reset successfully. Please restart the device.

Warning

It will take effect only by restarting the device after completing factory reset.

4.18 System

N35200 provides multiple communication interfaces. CAN interface supports CANOpen protocol. Other interfaces support standard Modbus and SCPI protocols. The default is Modbus. Users can set communication parameters under [**System**] interface, as shown in the figure below.

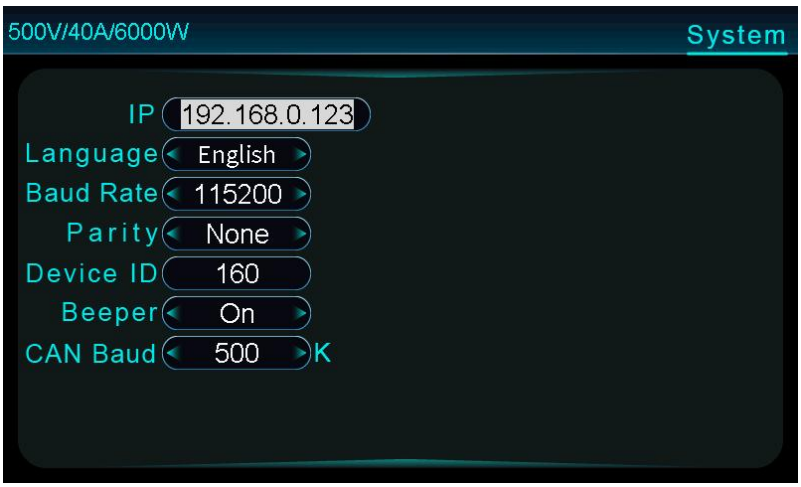


Figure 52 System

Warning

It will take effect only by restarting the device after modifying the parameters.

4.18.1 LAN

The default IP address is 192.168.0.123. The IP of computer must be in the same network segment as the IP of N35200, but the last digit should be different, otherwise the connection will fail.

4.18.2 Communication Protocol

N35200 supports SCPI, Modbus and CANopen communication protocols. CAN interface only supports CANopen protocol. Other interfaces support SCPI and Modbus protocols.

4.18.3 Baud Rate

The baud rate setting is valid for RS232, RS485, and USB virtual serial ports. Baud rate options are 4800, 9600, 19200, 38400, 115200. The default rate is 9600. The unit is bps. CAN interface baud rate is available at 125k/250k/500k/666k/800k/1000k. The default value is 500k. The unit is bps.

4.18.4 Parity

Parity setting is valid for serial communication. Options are None, Even, and Odd. The default value is None.

4.18.5 Device ID

The device ID is used to set address of communication connection. The settable range is 0~248. Default address is 160.

4.18.5 CAN Address

The CAN Address is used to set address of communication connection. The settable range is 1~127. Default address is 1.

4.18.7 Language

N35200 supports English and Chinese, which can be switched under [**System**].

5 Application Software Installation & Configuration

5.1 PC Software Configuration

To make better use of the system performance, the following computer configuration is recommended:

- CPU: 2.0G, dual-core and above
- Memory: 4G and above
- Hard disk: 80G and above
- Port: Ethernet port
- Operating system: Microsoft Windows 7 and above

5.1.1 Port Connection

Please plug the Ethernet cable to PC Ethernet port and the other side to N35200 LAN port. After N35200 series is turn on, enter the system configuration interface to check the network IP. PC needs to keep the same network segment with N35200 in order to search the device. When master computer is in remote sense, configure the system parameters in the device interface , as shown in the following figure.

Figure 53 Remote Sense

After the master computer is disconnected, wait for 3s-5s, and then press the **LOCK** to release the remote mode.

5.1.2 Disabling operating system standby mode

■ Windows 7 settings

Click **Start** → Click **Control Panel** → Click **Power Options** → Click **Change Computer Sleep Time**.

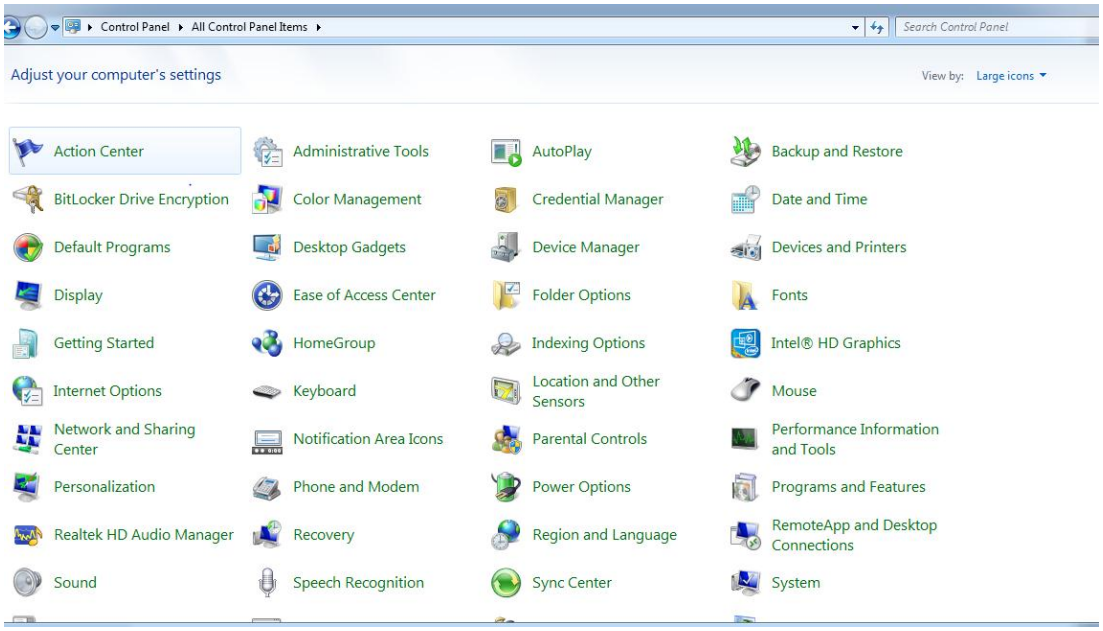


Figure 54 Windows 7 settings

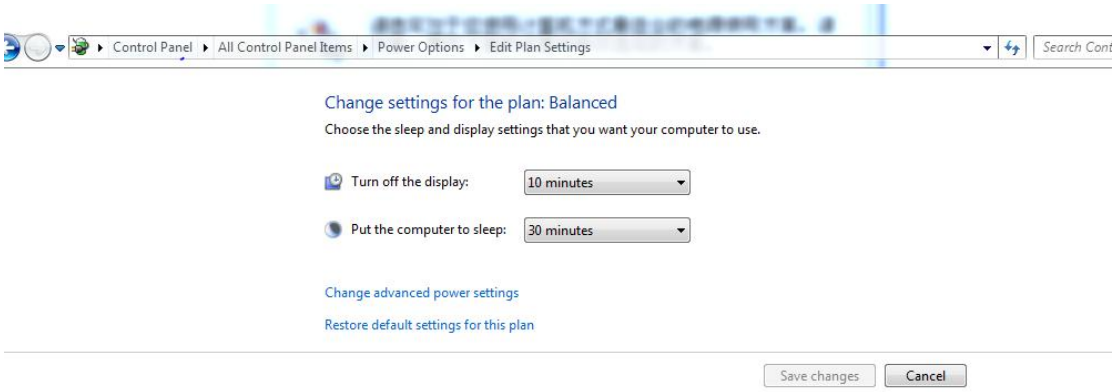


Figure 55 Windows 7 settings

Set **Turn off the display** and **Put the computer to sleep** to Never.

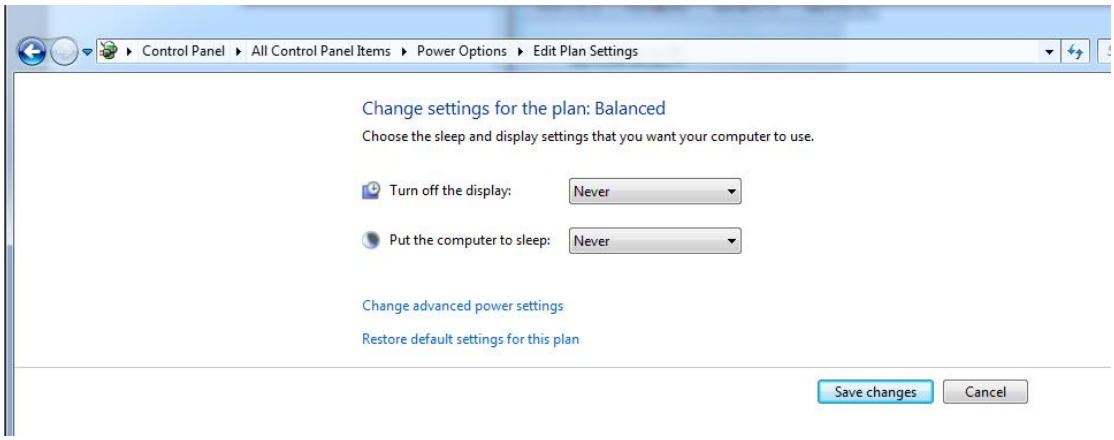


Figure 56 Windows 7 settings

■ Windows 10 settings

Click **Start**→Click **Settings**.

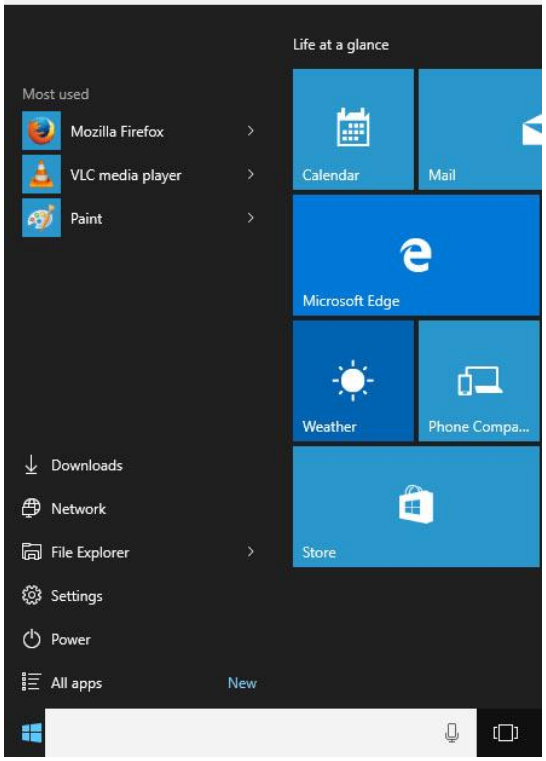


Figure 57 Windows 10 settings

Click **System**.

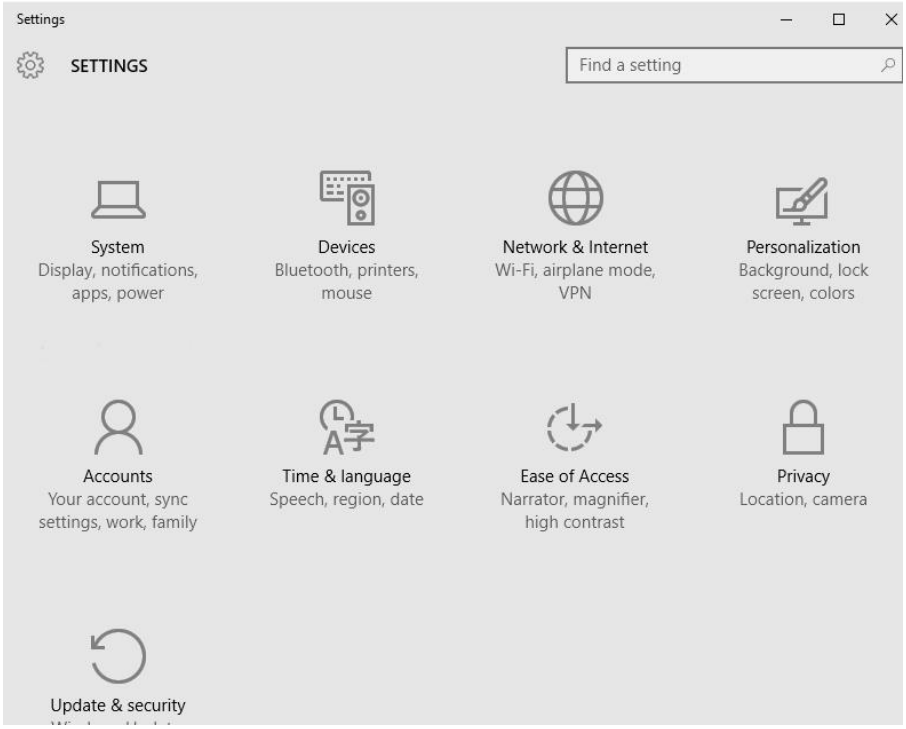


Figure 58 Windows 10 settings

Click **Power & sleep**.

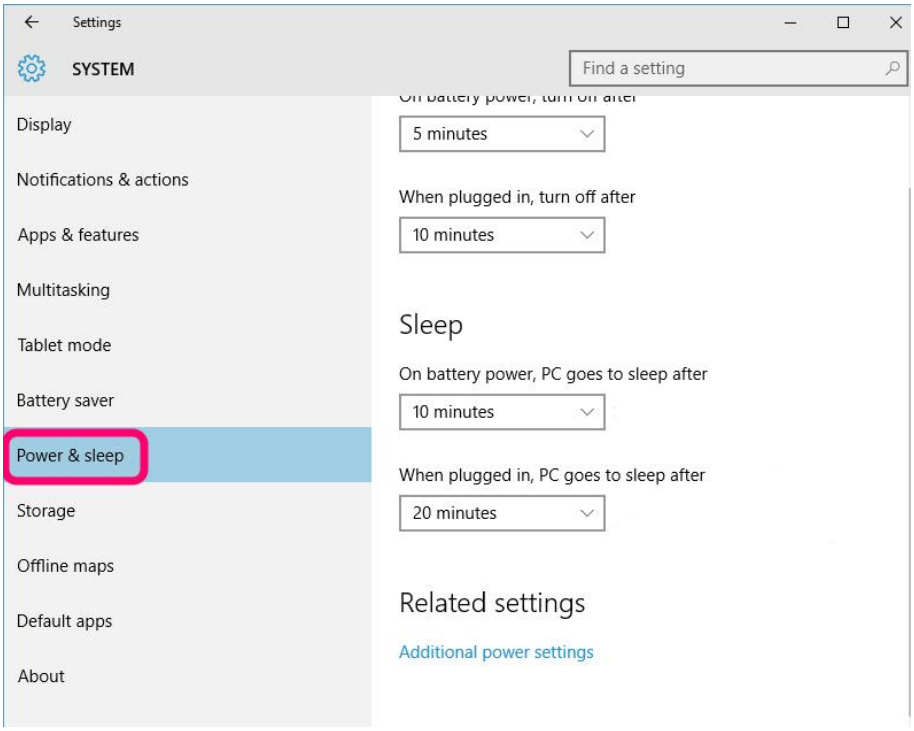


Figure 59 Windows 10 settings

Select **Never** for both options under **Sleep**.

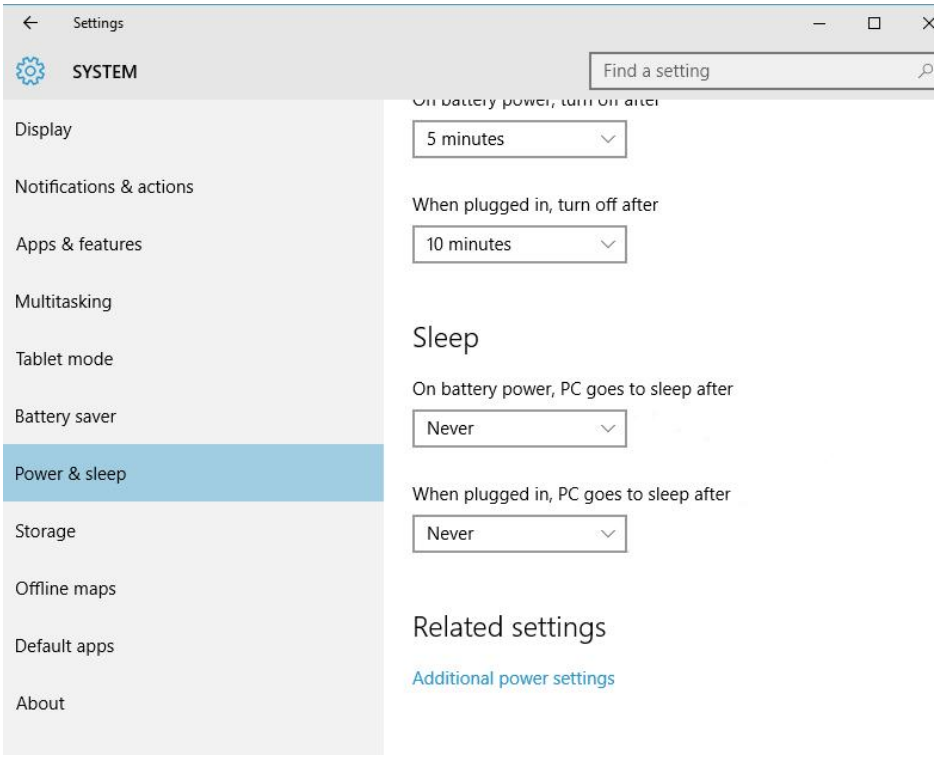


Figure 60 Windows 10 settings

5.1.3 Network IP Address Setting

The default IP of LAN port is 192.168.0.XXX (range from 0 to 255). Before operation, the computer IP should be assigned to the same network segment of N35200. But IP addresses should be different.

■ Windows 7 Setting

Click **Start**→Click **Control Panel**→Click **Network and Sharing Center**.

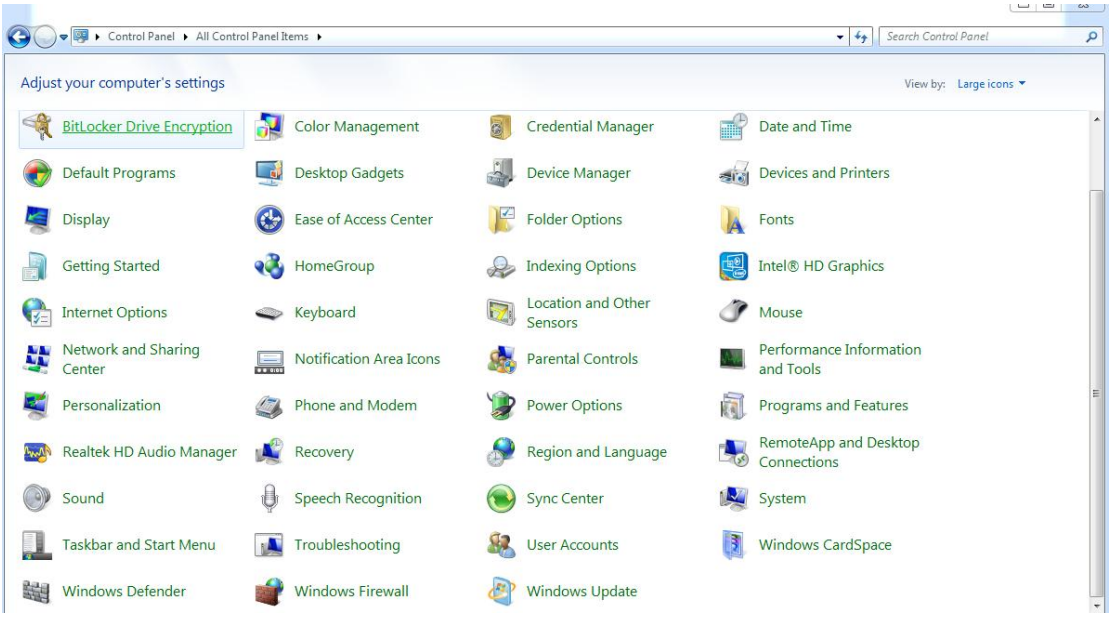


Figure 61 Network IP Address Setting

Click **Change adapter settings**.

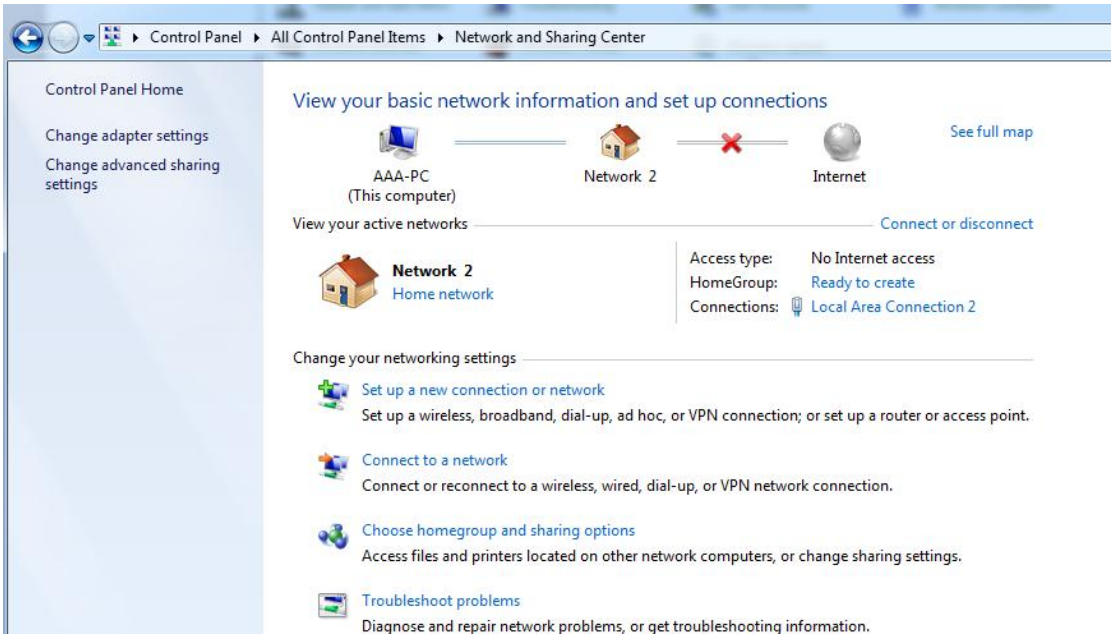


Figure 62 Network IP Address Setting

Select the network→Right click and choose **Properties**.

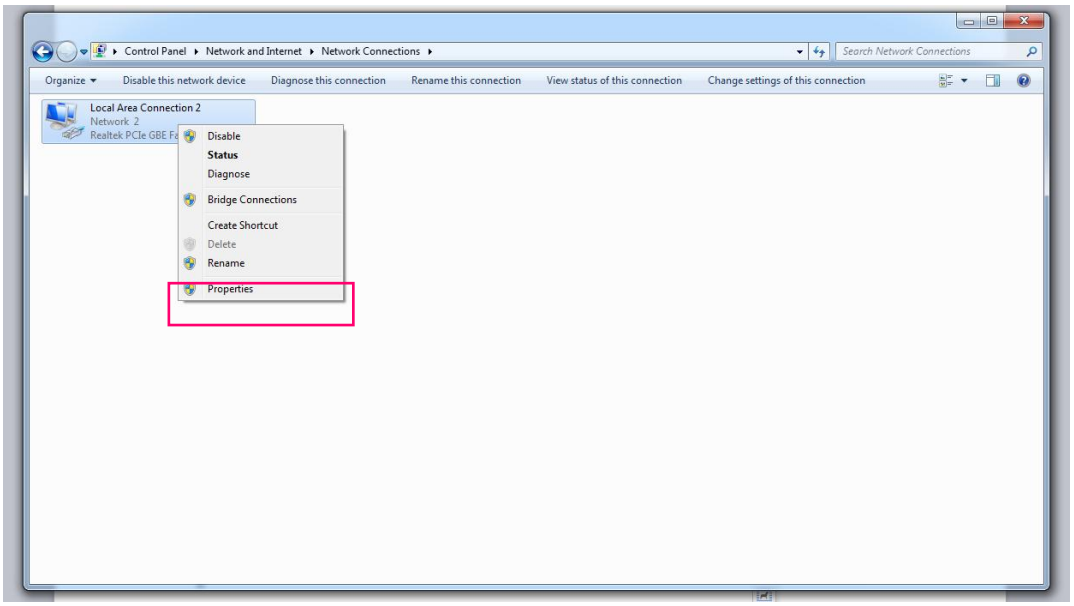


Figure 63 Network IP Address Setting

Click Internet Protocol Version 4(TCP/IPv4) and fill the below information and press **OK**.

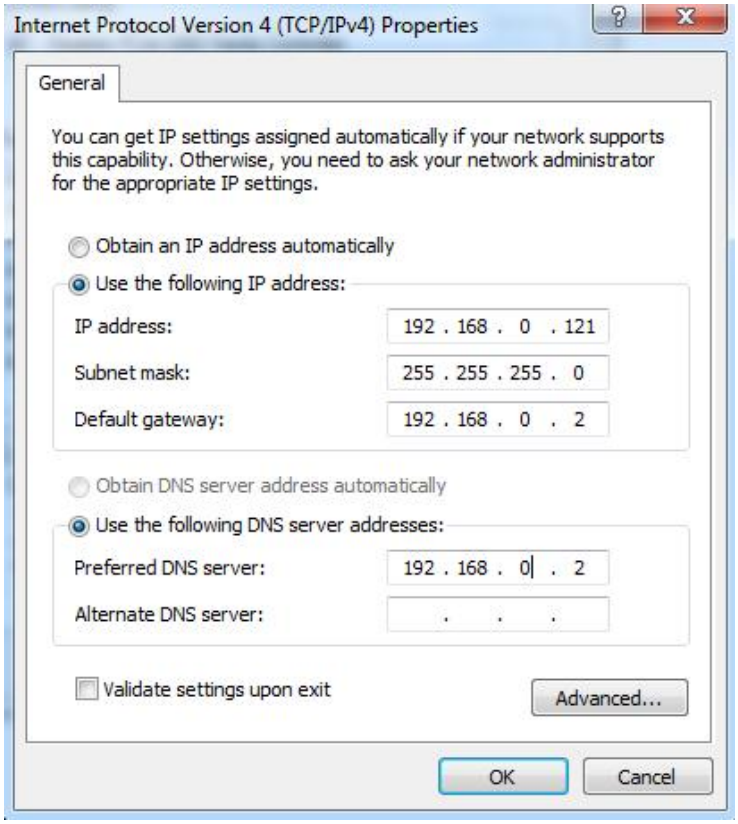


Figure 64 Network IP Address Setting

Click **Start**→Input **cmd**.

Input ping 192.168.0.123(default IP of N35200) and check if N35200 can communicate properly.

Figure 65 Run Command

If communicating properly, the below information will be reverted.

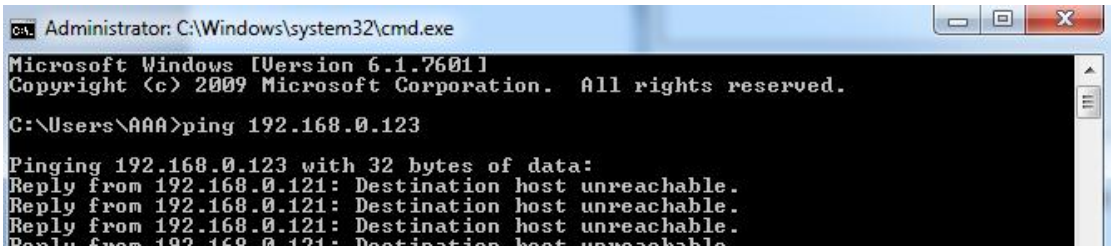


Figure 66 Communication Test

■ Windows 10 Setting

Click **Start**→Click **Set**→Click **Network & Internet**.

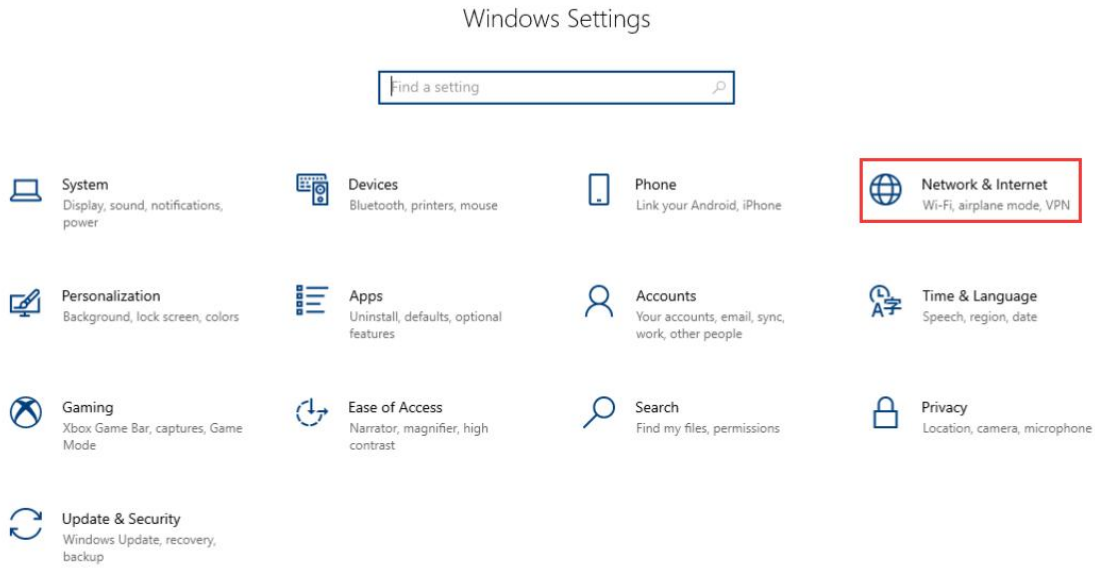


Figure 67 Network IP Address Setting

Click **Change adapter options**.

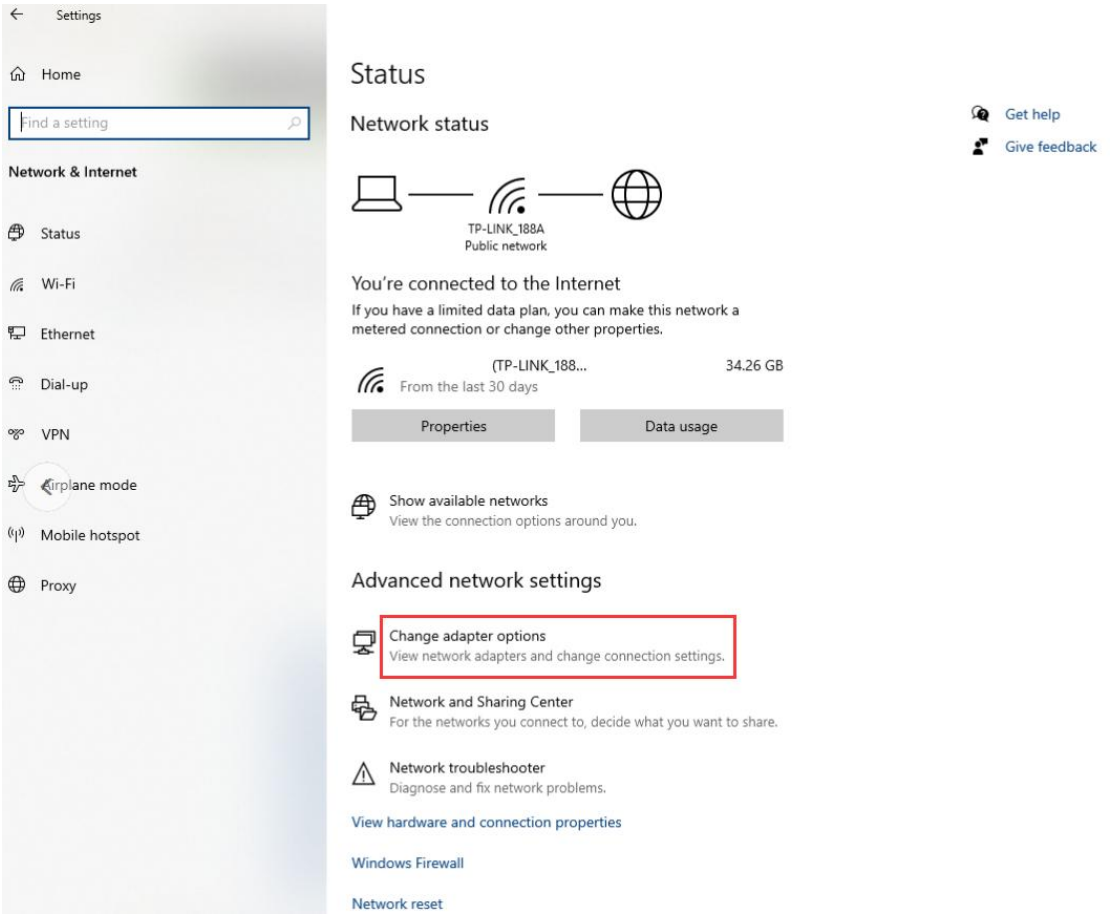


Figure 68 Network IP Address Setting

Select the network→Right click and choose **Properties**.

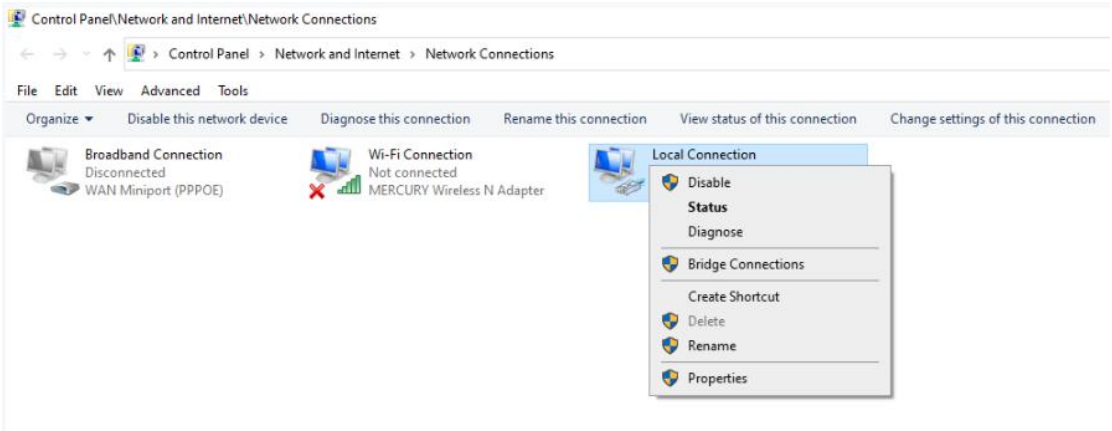


Figure 69 Network IP Address Setting

Click Internet Protocol Version 4(TCP/IPv4) and fill the below information and press **OK**.

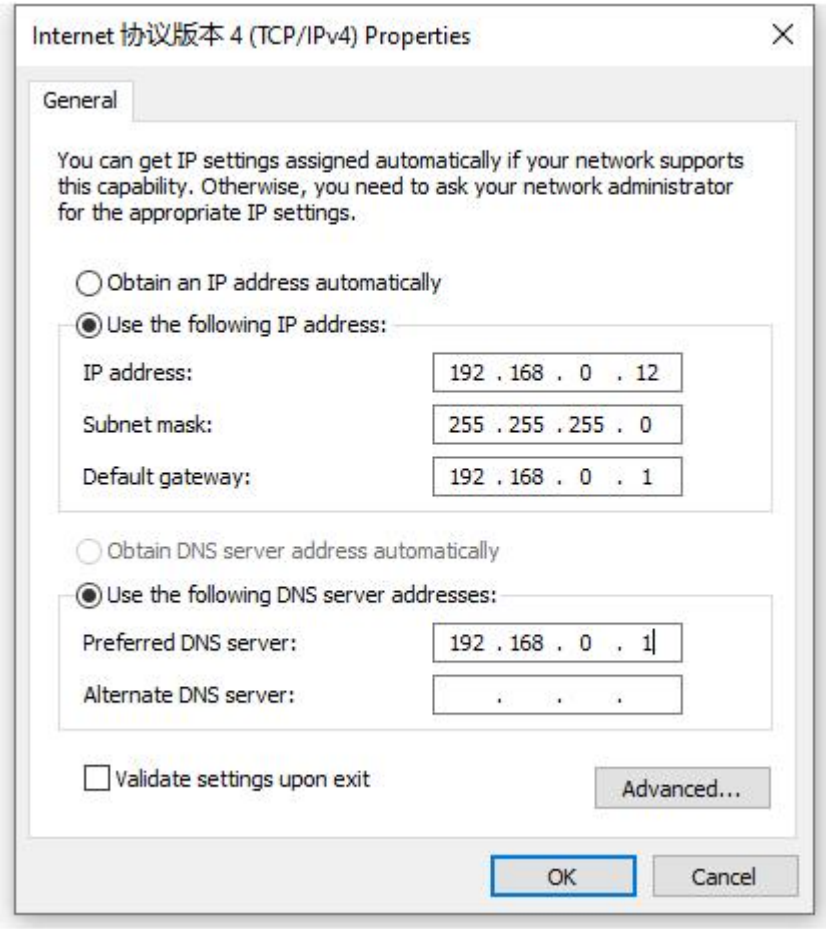


Figure 70 Network IP Address Setting

Click **Start**→Input **cmd**.

Input ping 192.168.0.123(default IP of N35200) and check if N35200 can communicate properly.

Figure 71 Run Command

If communicating properly, the below information will be reverted.

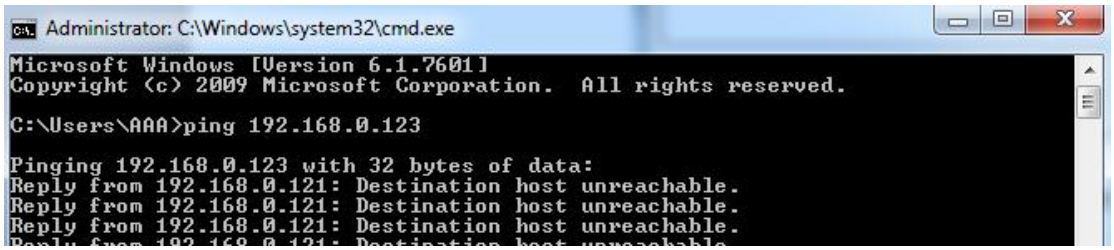


Figure 72 Communication Test

5.2 Application Software Installation and Uninstallation

5.2.1 Installation

1) Find the installation program "setup.exe" from the USB flash drive in accessory bag.

2) Make double-click on the file and begin installation.

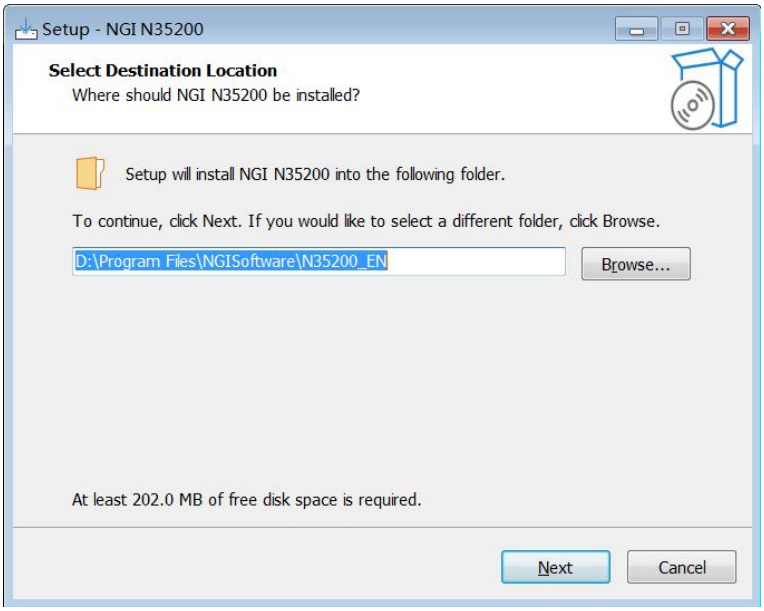


Figure 73 Program Installation

3) Click Next as prompted until the installation is completed. The software will automatically create a shortcut on the desktop.

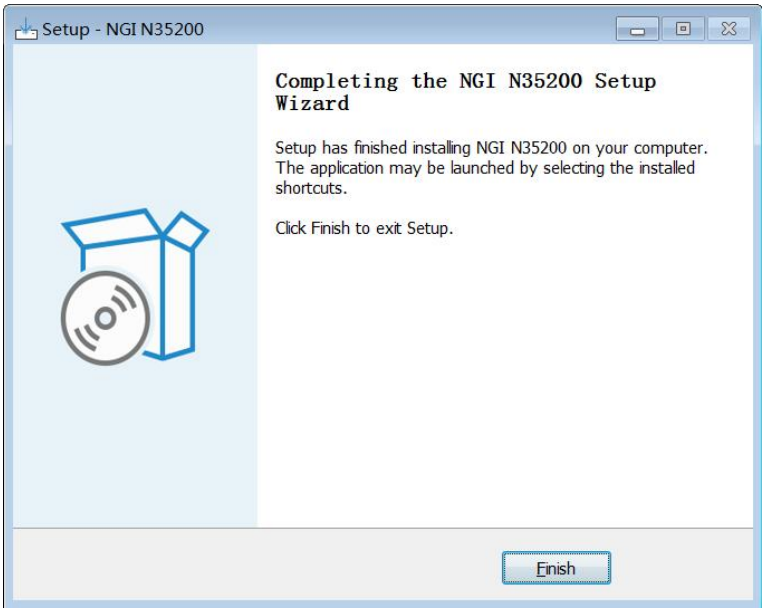


Figure 74 Installation Completed

5.2.2 Uninstallation

Methods for uninstallation:

Method 1: Program uninstallation can be completed through **Uninstall Program** in **Control Panel** of the operating system, or by right-clicking the shortcut and selecting uninstall.

Method 2: Find the setup program in your computer disk and delete.

5.3 Operation

After the application software is successfully installed, a shortcut icon will be generated on the desktop. Please click the shortcut to enter the menu.

Figure 75 Shortcut

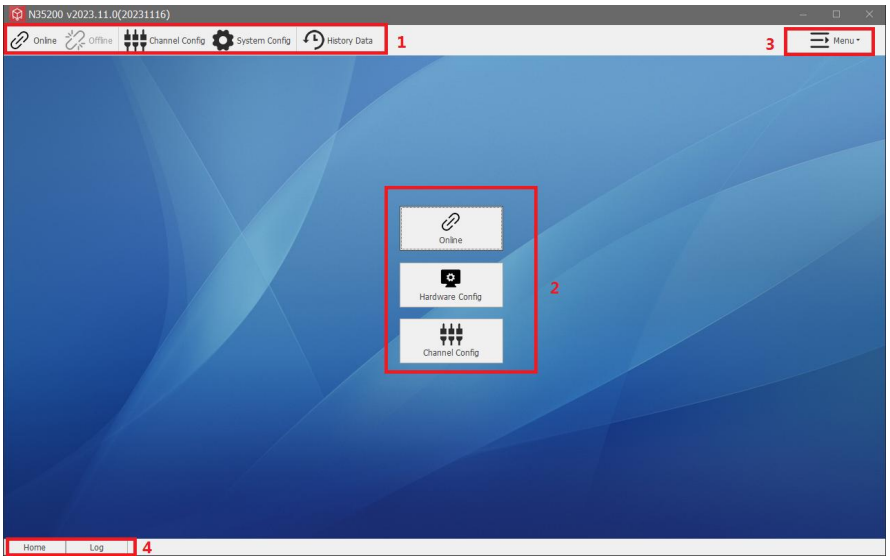


Figure 76 Application Software Interface

Application software interface introduction:

1. Toolbar

It includes Online and Offline, Channel Config, System Config, History Data, graph.

2. Menu

It includes Hardware Config, Channel Config.

3. Shortcut menu

4. Log

Operation, fault and status information can be found in Log.

5.3.1 Hardware Configuration

Operation Steps:

1. Click **Hardware Config**.

2. Click **Scan**→Select 192.168.0.XXX network→Click **OK**→Click **Save** after the device is searched.

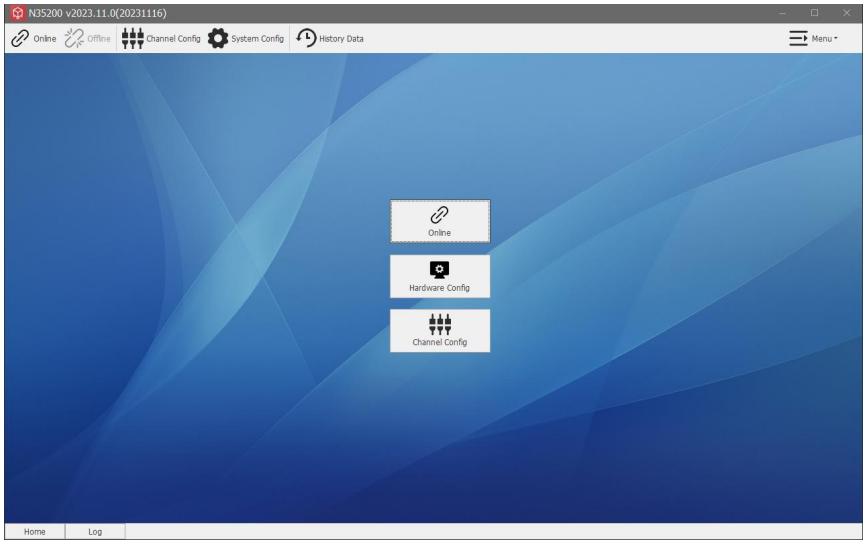


Figure 77 Application Interface

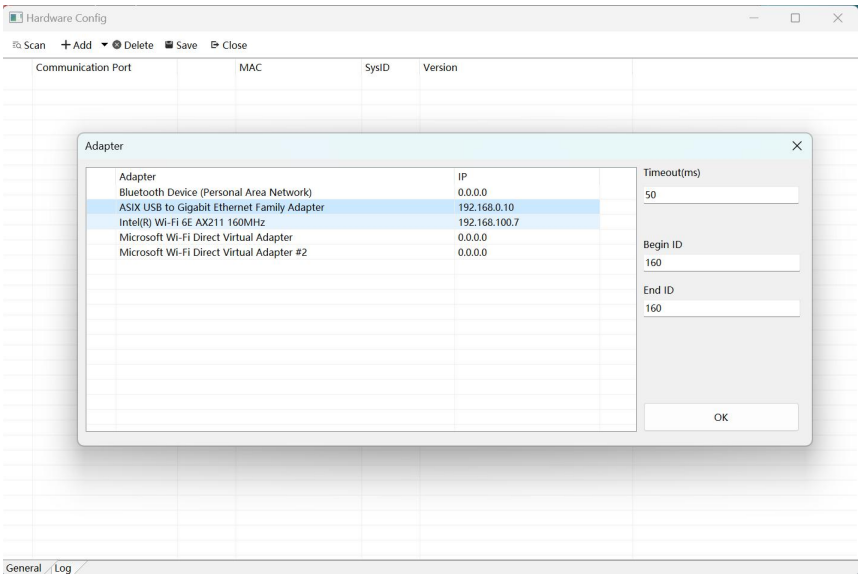


Figure 78 Hardware Configuration

5.3.2 Channel Configuration

Operation Steps:

1. Click **Channel Config**.
2. Change Channel: Click **Channel**→Input contents
3. Default Channel: Click **Other**→Set default value, Channel will be named from CH1 to CH99.
4. Multiple Devices Operation: Click **Other**→Select **ON-All**, quickly select all devices in the segment.

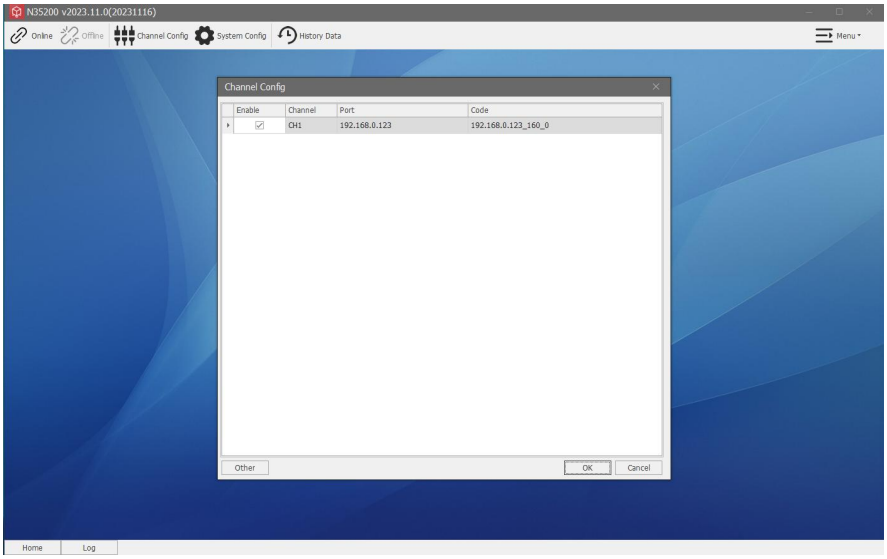


Figure 79 Channel Configuration

5.3.3 Software Interface

1. Toolbar: Online, Offline, Channel configuration, System configuration, Clear error, Historical data.

2. Function: Normal mode, Sequence mode, Resistance simulation, RAMP, CR, Charge, discharge mode.

Each mode can set parameters, after setting parameters, click **submit** or **ON** that is, turn on the power supply under the parameters of the mode.

3. Graph: it contains data charts and status information, channel name, function mode, output voltage, output current, output power.

4. Start Logging: Click the **Start Logging** to save data, the file data (.ndat format) will be automatically saved to the history data, users can choose to view in the **History Data**.

5. Protection: set protection voltage, protection current and protection power; Function parameter: set voltage slew, current slew, CV/CC priority, fast discharge, etc.

Figure 80 Software Interface

5.3.4 Normal Mode

Normal mode is default mode, and users can set the voltage parameters in this mode. Respectively, users also can set the current and power of the source mode and load mode.

Operation steps:
Click **Submit** after the setting is completed→write the set value→click **ON** and **OFF** to control the switch. As shown in the figure below:

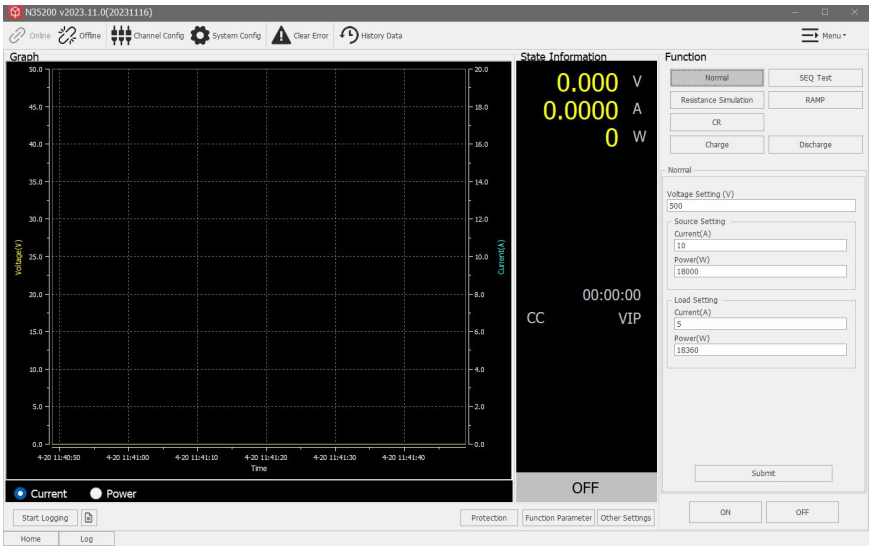


Figure 81 Normal Mode

5.3.5 SEQ Test

Operation steps:

Click **SEQ Test** to edit SEQ file→click **ON** and **OFF** to execute or end file.

As shown in the figure below:

Figure 82 SEQ Test

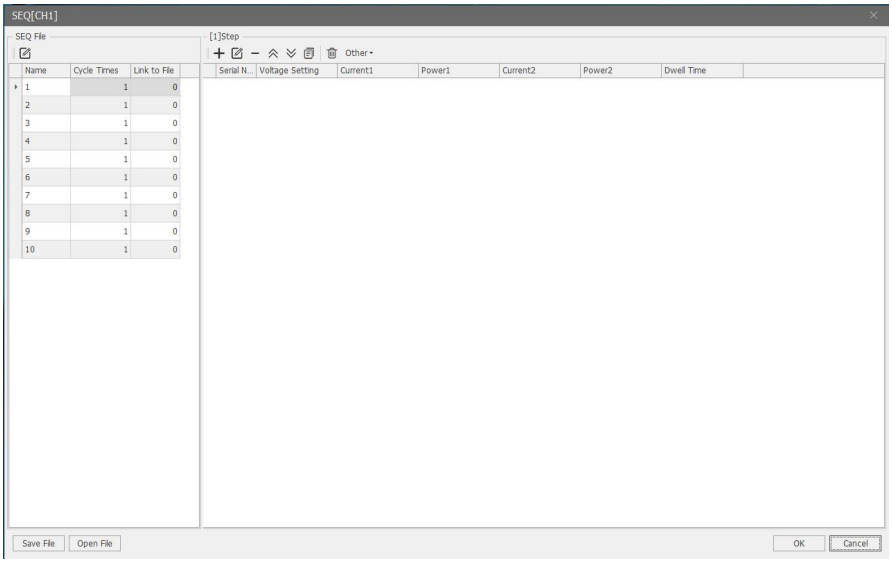


Figure 83 SEQ Edit

5.3.6 Charge

Click **Charge** to test charging voltage, current and to set end voltage, current, power, time→click **Submit**→click **ON** and **OFF** to start or stop test.
As shown in the figure below:

Figure 84 Charge Test

5.3.7 Discharge Test

Click **Discharge** to test discharging voltage, current and to set end voltage, current, power, time→click **Submit**→click **ON** and **OFF** to start or stop test.
As shown in the figure below:

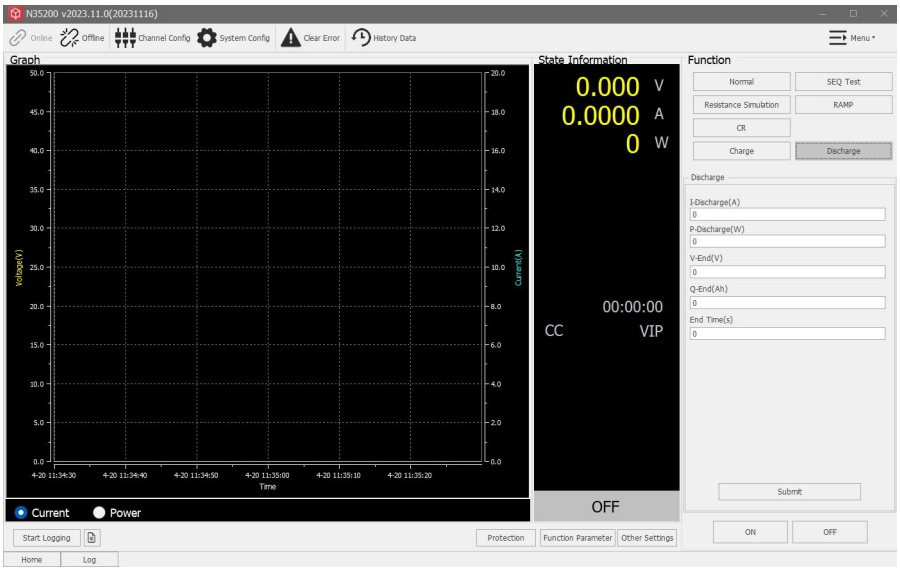


Figure 85 Discharge Test

5.3.8 CR Mode

Click **CR** to simulate resistance/current/power value→click **Submit**→click **ON** and **OFF** to start or stop test.
As shown in the figure below:

Figure 86 CR Mode

5.3.9 Protection

Click **Protection** to set parameters→click **Submit.** As shown in the figure below:

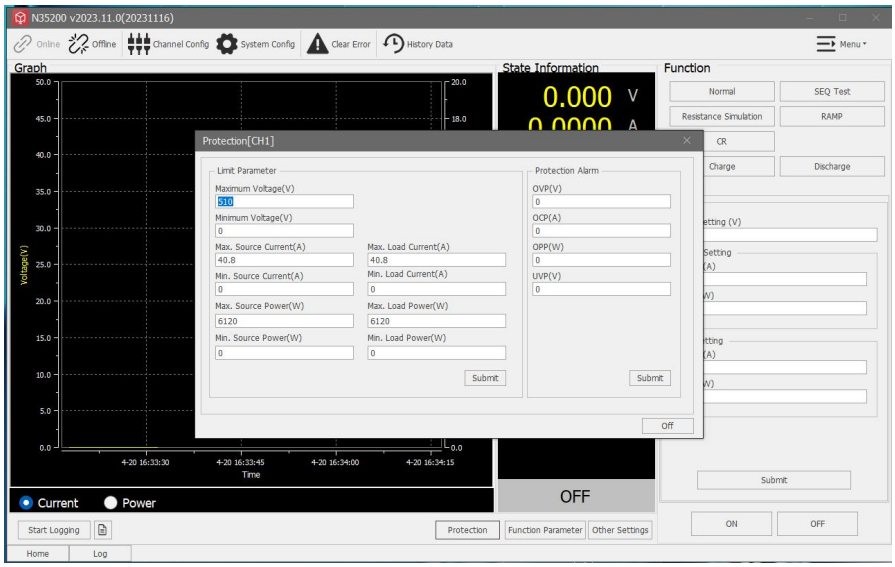


Figure 87 Protection

5.3.10 Function Parameter

Click **Function Parameter** to set parameters→click **Submit.** As shown in the figure below：

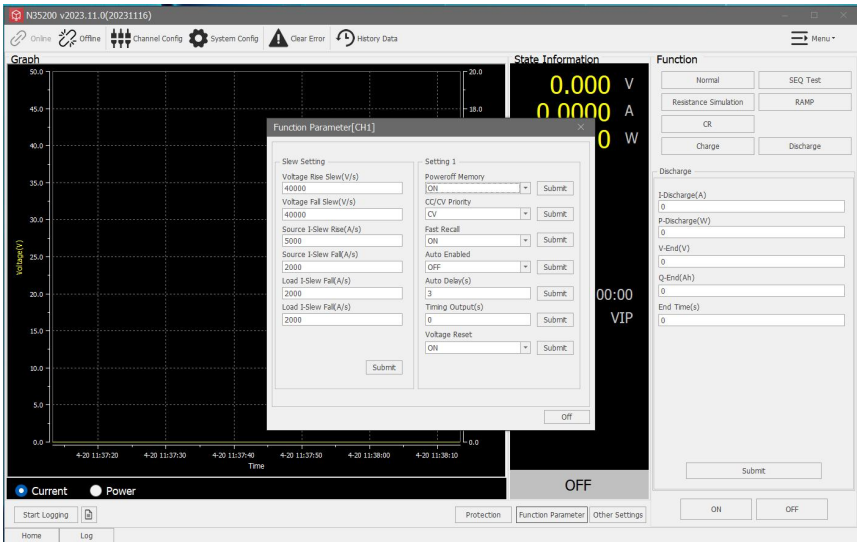


Figure 88 Function Parameter

5.3.11 Other Settings

Click **Other Settings** to set external programming and master/slave configuration→click **Submit**→close interface**.** As shown in the figure below：

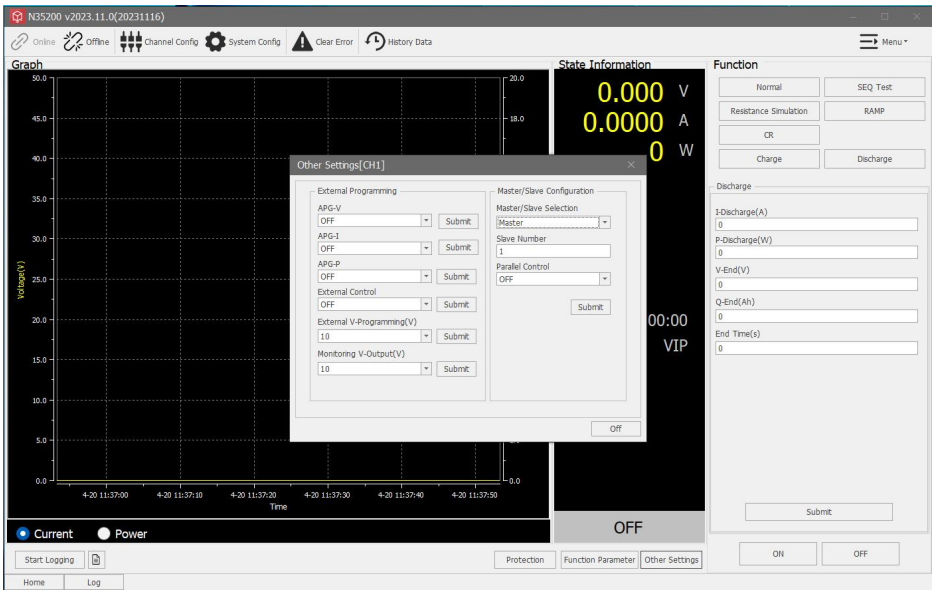


Figure 89　Other Settings

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 N35200 series should be calibrated once a year.

7 Main Technical Data

Warning

1. 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%.
2. Please warm up the device for half hour to ensure the measurement accuracy.
3. Ripple measurement conditions: voltage measurement bandwidth 20Hz~20MHz, test probe port connected to 10μF+0.1μF capacitor.

Table 19

Model	N35205-80-150	N35206-300-75	N35206-500-40	N35206-800-25
Voltage	0～80V	0～300V	0～500V	0～800V
Current	-150A～150A	-75A～75A	-40A～40A	-25A～25A
Resistance	0.016Ω～106.666Ω	0.04Ω～800Ω	0.1Ω～2.5kΩ	0.32Ω～6.4kΩ
Power	-5kW～+5kW	-6kW～+6kW	-6kW～+6kW	-6kW～+6kW
Constant Voltage Mode				
Range	0～80V	0～300V	0～500V	0～800V
Setting Resolution	1mV	10mV	10mV	10mV
Setting Accuracy (23±5℃)	0.02%+0.02%F.S.	0.02%+0.02%F.S	0.02%+0.02%F.S.	0.02%+0.02%F.S.
Readback Resolution	1mV	10mV	10mV	10mV
Readback Accuracy (23±5℃)	0.02%+0.02%F.S.	0.02%+0.02%F.S.	0.02%+0.02%F.S.	0.02%+0.02%F.S.
Voltage Reple（Vpp）	≤220mV	≤350mV	≤350mV	≤500mV
Voltage Riple（Vrms）	≤25mV	≤40mV	≤40mV	≤100mV
Temperature Coefficient	≤50ppm/℃			
Constant Current Mode				
Range	-150A～150A	-75A～75A	-40A～40A	-25A～25A
Setting Resolution	10mA	1mA	1mA	1mA
Readback Accuracy (23±5℃)	0.1%+0.1%F.S.			

Readback Resolution	10mA	1mA	1mA	1mA
Readback Accuracy(23±5℃)	0.1%+0.1%F.S.			
Temperature Coefficient	≤100ppm/℃			
Constant Power Mode				
Range	-5kW～+5kW	-6kW～+6kW	-6kW～+6kW	-6kW～+6kW
Setting Resolution	1W			
Readback Accuracy (23±5℃)	0.5%F.S.			
Readback Resolution	1W			
Readback Accuracy(23±5℃)	0.5%F.S.			
Constant Resistance Mode				
Range	0.016Ω～106.666Ω	0.04Ω～800Ω	0.1Ω～2.5kΩ	0.32Ω～6.4kΩ
Setting Resolution	0.001Ω			
Readback Accuracy (23±5℃)	Vin/Rset*0.01%+0.2% I.F.S			
Readback Resolution	0.001Ω			
Readback Accuracy(23±5℃)	Vin/Rset*0.01%+0.2% I.F.S			
External Analog Programming				
Voltage Range	0~10V corresponding to rated output voltage			
Current Range	0~10V corresponding to rated output current			
Power Range	0~10V corresponding to rated output power			
Voltage Accuracy	0.2%F.S.			
Current Accuracy	0.2%F.S.			
Power Accuracy	0.5%F.S			
Line Regulation				
Voltage	≤0.01%F.S.			
Current	≤0.05%F.S.			
Load Regulation				
Voltage	≤0.02%F.S.			
Current	≤0.05%F.S.			
Dynamic Characteristic				
Max.Voltage Rise Slew Rate	6V/ms	15V/ms	20V/ms	40V/ms
Max.Voltage Fall Slew Rate	6V/ms	15V/ms	20V/ms	40V/ms

Voltage Fall Time（no load）100%-0	≤300ms	≤500ms	≤700ms	≤900ms
Voltage Rise Time（no load）10%-90%	≤11ms	≤16ms	≤20ms	≤16ms
Transient Recovery Time	The recovery time of load varying 10%~90% and voltage recovering within 0.75% accuracy range of rated value is within 2ms.			
Others				
Parallel	Support Max.10 units same parameter device master-slave parallel connection			
Communication Interface	Standard LAN,RS232,Optional GPIB/USB/RS485/CAN communication			
Communication Protocol	SCPI/MODBUS-RTU/CAN-Open			
Response Time	Support Max.10 units same parameter device master-slave parallel connection			
AC Input				
Input	Three phase , Please refer to the voltage mark at the rear panel.			
Efficiency	93%（typical）			
Power Factor	0.99（typical）			
Operating Environment				
Temp.specification	Operating Temp.：0℃~ 40℃； Storage Temp.：-20℃~ 70℃			
Environment	Altitude:＜2000m；Relative Humidity：5% ~ 90%（non condensing）；Air Pressure：80kPa ~ 110kPa			
Dimension（mm）	132.5(H)*482.0(W)*752(D), include the protective cover			
Net weight	≈18kg			

Table 20

Model	N35210-80-300	N35212-300-150	N35212-500-80	N35212-800-50
Voltage	0～80V	0～300V	0～500V	0～800V
Current	-300A～300A	-150A～150A	-80A～80A	-50A～50A
Resistance	0.008Ω～53.333Ω	0.02Ω～400Ω	0.05Ω～1.25kΩ	0.16Ω～3.2kΩ
Power	-10kW～+10kW	-12kW～+12kW	-12kW～+12kW	-12kW～+12kW
Constant Voltage Mode				
Range	0～80V	0～300V	0～500V	0～800V
Setting Resolution	1mV	10mV	10mV	10mV
Setting Accuracy (23±5℃)	0.02%+0.02%F.S.	0.02%+0.02%F.S.	0.02%+0.02%F.S.	0.02%+0.02%F.S.
Readback Resolution	1mV	10mV	10mV	10mV
Readback Accuracy (23±5℃)	0.02%+0.02%F.S.	0.02%+0.02%F.S.	0.02%+0.02%F.S.	0.02%+0.02%F.S.

Voltage Reple（Vpp）	≤200mV	≤250mV	≤350mV	≤500mV
Voltage Riple （Vrms）	≤25mV	≤35mV	≤40mV	≤100mV
Temperature Coefficient	≤50ppm/℃			
Constant Current Mode				
Range	-300A～300A	-150A～150A	-80A～80A	-50A～50A
Setting Resolution	10mA	10mA	1mA	1mA
Readback Accuracy (23±5℃)	0.1%+0.1%F.S.			
Readback Resolution	10mA	1mA	1mA	1mA
Readback Accuracy(23±5℃)	0.1%+0.1%F.S.			
Temperature Coefficient	≤100ppm/℃			
Constant Power Mode				
Range	-5kW～+5kW	-6kW～+6kW	-6kW～+6kW	-6kW～+6kW
Setting Resolution	1W			
Readback Accuracy (23±5℃)	0.5%F.S.			
Readback Resolution	1W			
Readback Accuracy(23±5℃)	0.5%F.S.			
Constant Resistance Mode				
Range	0.008Ω～53.333Ω	0.02Ω～400Ω	0.05Ω～1.25kΩ	0.16Ω～3.2kΩ
Setting Resolution	0.001Ω			
Readback Accuracy (23±5℃)	Vin/Rset*0.01%+0.2% I.F.S			
Readback Resolution	0.001Ω			
Readback Accuracy(23±5℃)	Vin/Rset*0.01%+0.2% I.F.S			
External Analog Programming				
Voltage Range	0~10V corresponding to rated output voltage			
Current Range	0~10V corresponding to rated output current			
Power Range	0~10V corresponding to rated output power			

Voltage Accuracy	0.2%F.S.			
Current Accuracy	0.2%F.S.			
Power Accuracy	0.5%F.S			
Line Regulation				
Voltage	≤0.01%F.S.			
Current	≤0.05%F.S.			
Load Regulation				
Voltage	≤0.02%F.S.			
Current	≤0.05%F.S.			
Dynamic Characteristic				
Max.Voltage Rise Slew Rate	6V/ms	15V/ms	20V/ms	40V/ms
Max.Voltage Fall Slew Rate	6V/ms	15V/ms	20V/ms	40V/ms
Voltage Fall Time （no load）100%-0	≤300ms	≤500ms	≤700ms	≤900ms
Voltage Rise Time （no load） 10%-90%	≤11ms	≤16ms	≤20ms	≤16ms
Transient Recovery Time	The recovery time of load varying 10%~90% and voltage recovering within 0.75% accuracy range of rated value is within 2ms.			
Others				
Parallel	Support Max.10 units same parameter device master-slave parallel connection			
Communication Interface	Standard LAN,RS232,Optional GPIB/USB/RS485/CAN communication			
Communication Protocol	SCPI/MODBUS-RTU/CAN-Open			
Response Time	≤2ms			
AC Input				
Input	Three phase , Please refer to the voltage mark at the rear panel.			
Efficiency	93%（typical）			
Power Factor	0.99（typical）			
Operating Environment				
Temp.specification	Operating Temp.：0℃~ 40℃； Storage Temp.：-20℃~ 70℃			
Environment	Altitude:＜2000m；Relative Humidity：5% ~ 90%（non condensing）；Air Pressure：80kPa ~ 110kPa			
Dimension（mm）	132.5(H)*482.0(W)*752(D), include the protective cover			
Net weight	≈25kg			

Table 21

Model	N35212-1000-40	N35212-1500-25
Voltage	0～1000V	0～1500V
Current	-40A～40A	-25A～25A
Resistance	0.25Ω~5kΩ	0.6Ω~12kΩ
Power	-12kW～+12kW	-12kW～+12kW
Constant Voltage Mode		
Range	0～1000V	0～1500V
Setting Resolution	100mV	100mV
Readback Accuracy (23±5℃)	0.02%+0.02%F.S.	0.02%+0.02%F.S.
Readback Resolution	100mV	100mV
Readback Accuracy(23±5℃)	0.02%+0.02%F.S.	0.02%+0.02%F.S.
Voltage Ripple(Vpp)	≤850mV	≤1300mV
Voltage Ripple(Vrms)	≤150mV	≤300mV
Temperature Coefficient	≤50ppm/℃	
Constant Current Mode		
Range	-40A～40A	-25A～25A
Setting Resolution	1mA	1mA
Readback Accuracy (23±5℃)	0.1%+0.1%F.S.	
Readback Resolution	1mA	1mA
Readback Accuracy(23±5℃)	0.1%+0.1%F.S.	
Temperature Coefficient	≤100ppm/℃	
Constant Power Mode		
Range	-12kW～+12kW	-12kW～+12kW
Setting Resolution	1W	
Readback Accuracy (23±5℃)	0.5%F.S.	
Readback Resolution	1W	

Readback Accuracy(23±5℃)	0.5%F.S.	
Constant Resistance Mode		
Range	0.25Ω~5kΩ	0.6Ω~12kΩ
Setting Resolution	0.01Ω	
Readback Accuracy (23±5℃)	Vin/Rset*0.01%+0.2% I.F.S	
Readback Resolution	0.01Ω	
Readback Accuracy(23±5℃)	Vin/Rset*0.01%+0.2% I.F.S	
External Analog Programming		
Voltage Range	0~10V corresponding to rated output voltage	
Current Range	0~10V corresponding to rated output current	
Power Range	0~10V corresponding to rated output power	
Voltage Accuracy	0.2%F.S.	
Current Accuracy	0.2%F.S.	
Power Accuracy	0.5%F.S	
Line Regulation		
Voltage	≤0.01%F.S.	
Current	≤0.05%F.S.	
Load Regulation		
Voltage	≤0.02%F.S.	
Current	≤0.05%F.S.	
Dynamic Characteristic		
Max.Voltage Rise Slew Rate	40V/ms	40V/ms
Max.Voltage Fall Slew Rate	40V/ms	40V/ms
Voltage Fall Time （no load）100%-0	≤1400ms	≤1600ms
Voltage Rise Time （no load） 10%-90%	≤20ms	≤30ms
Transient Recovery Time	The recovery time of load varying 10%~90% and voltage recovering within 0.75% accuracy range of rated value is within 2ms.	
Others		
Parallel	Support Max.10 units same parameter device master-slave parallel connection	
Communication	Standard LAN,RS232,Optional GPIB/USB/RS485/CAN communication	

Interface	
Communication Protocol	SCPI/MODBUS-RTU/CAN-Open
Response Time	≤2ms
AC Input	
Input	Three phase , Please refer to the voltage mark at the rear panel.
Efficiency	93%（typical）
Power Factor	0.99（typical）
Operating Environment	
Temp.specification	Operating Temp.：0℃~ 40℃；Storage Temp.：-20℃~ 70℃
Environment	Altitude:＜2000m；Relative Humidity：5% ~ 90%（non condensing）；Air Pressure：80kPa ~ 110kPa
Dimension（mm）	132.5(H)*482.0(W)*752(D), include the protective cover
Net weight	≈25kg

Table 22

Model	N35215-80-450	N35218-300-225	N35218-500-120	N35218-800-75
Voltage	0～80V	0～300V	0～500V	0～800V
Current	-450A～450A	-225A～225A	-120A～120A	-75A～75A
Resistance	0.005Ω~35.556Ω	0.013~266.666Ω	0.033Ω~833.333Ω	0.106Ω~2.133kΩ
Power	-15kW～+15kW	-18kW～+18kW	-18kW～+18kW	-18kW～+18kW
Constant Voltage Mode				
Range	0～80V	0～300V	0～500V	0～800V
Setting Resolution	1mV	10mV	10mV	10mV
Readback Accuracy (23±5℃)	0.02%+0.02%F.S.	0.02%+0.02%F.S.	0.02%+0.02%F.S.	0.02%+0.02%F.S.
Readback Resolution	1mV	10mV	10mV	10mV
Readback Accuracy(23±5℃)	0.02%+0.02%F.S.	0.02%+0.02%F.S.	0.02%+0.02%F.S.	0.02%+0.02%F.S.
Voltage Ripple(Vpp)	≤200mV	≤250mV	≤300mV	≤500mV
Voltage Ripple(Vrms)	≤25mV	≤40mV	≤40mV	≤100mV
Temperature Coefficient	≤50ppm/℃			
Constant Current Mode				
Range	-450A～450A	-225A～225A	-120A～120A	-75A～75A
Setting Resolution	10mA	10mA	10mA	1mA
Readback Accuracy	0.1%+0.1%F.S.			

(23±5℃)				
Readback Resolution	10mA	1mA	10mA	1mA
Readback Accuracy(23±5℃)	0.1%+0.1%F.S.			
Temperature Coefficient	≤100ppm/℃			
Constant Power Mode				
Range	-15kW～+15kW	-18kW～+18kW	-18kW～+18kW	-18kW～+18kW
Setting Resolution	1W			
Readback Accuracy (23±5℃)	0.5%F.S.			
Readback Resolution	1W			
Readback Accuracy(23±5℃)	0.5%F.S.			
Constant Resistance Mode				
Range	0.005Ω~35.556Ω	0.013~266.666Ω	0.033Ω~833.333Ω	0.106Ω~2.133kΩ
Setting Resolution	0.001Ω			
Readback Accuracy (23±5℃)	Vin/Rset*0.01%+0.2% I.F.S			
Readback Resolution	0.001Ω			
Readback Accuracy(23±5℃)	Vin/Rset*0.01%+0.2% I.F.S			
External Analog Programming				
Voltage Range	0~10V corresponding to rated output voltage			
Current Range	0~10V corresponding to rated output current			
Power Range	0~10V corresponding to rated output power			
Voltage Accuracy	0.2%F.S.			
Current Accuracy	0.2%F.S.			
Power Accuracy	0.5%F.S			
Line Regulation				
Voltage	≤0.01%F.S.			
Current	≤0.05%F.S.			
Load Regulation				
Voltage	≤0.02%F.S.			
Current	≤0.05%F.S.			
Dynamic Characteristic				
Max.Voltage Rise Slew	6V/ms	15V/ms	20V/ms	40V/ms

Rate				
Max.Voltage Fall Slew Rate	6V/ms	15V/ms	20V/ms	40V/ms
Voltage Fall Time（no load）100%-0	≤300ms	≤500ms	≤700ms	≤900ms
Voltage Rise Time（no load）10%-90%	≤11ms	≤16ms	≤20ms	≤16ms
Transient Recovery Time	The recovery time of load varying 10%~90% and voltage recovering within 0.75% accuracy range of rated value is within 2ms.			
Others				
Parallel	Support Max.10 units same parameter device master-slave parallel connection			
Communication Interface	Standard LAN,RS232,Optional GPIB/USB/RS485/CAN communication			
Communication Protocol	SCPI/MODBUS-RTU/CAN-Open			
Response Time	≤2ms			
AC Input				
Input	Three phase , Please refer to the voltage mark at the rear panel.			
Efficiency	93%（typical）			
Power Factor	0.99（typical）			
Operating Environment				
Temp.specification	Operating Temp.：0℃~ 40℃；Storage Temp.：-20℃~ 70℃			
Environment	Altitude:＜2000m；Relative Humidity：5% ~ 90%（non condensing）；Air Pressure：80kPa ~ 110kPa			
Dimension（mm）	132.5(H)*482.0(W)*752(D), include the protective cover			
Net weight	≈36kg			

Table 23

Model	N35218-1500-40	N35218-2250-25
Voltage	0～1500V	0～2250V
Current	-40A～40A	-25A～25A
Resistance	0.375Ω~7.5kΩ	0.8Ω~18kΩ
Power	-18kW～+18kW	-18kW～+18kW
Constant Voltage Mode		
Range	0～1500V	0～2250V
Setting Resolution	100mV	100mV

Readback Accuracy (23±5℃)	0.02%+0.02%F.S.	0.02%+0.02%F.S.
Readback Resolution	100mV	100mV
Readback Accuracy(23±5℃)	0.02%+0.02%F.S.	0.02%+0.02%F.S.
Voltage Ripple(Vpp)	≤1300mV	≤2500mV
Voltage Ripple(Vrms)	≤300mV	≤400mV
Temperature Coefficient	≤50ppm/℃	
Constant Current Mode		
Range	-40～40A	-25～25A
Setting Resolution	1mA	1mA
Readback Accuracy (23±5℃)	0.1%+0.1%F.S.	
Readback Resolution	1mA	1mA
Readback Accuracy(23±5℃)	0.1%+0.1%F.S.	
Range	≤100ppm/℃	
Constant Power Mode		
Range	-18kW～+18kW	-18kW～+18kW
Setting Resolution	1W	
Readback Accuracy (23±5℃)	0.5%F.S.	
Readback Resolution	1W	
Readback Accuracy(23±5℃)	0.5%F.S.	
Constant Resistance Mode		
Range	0.375Ω~7.5kΩ	0.8Ω~18kΩ
Setting Resolution	0.01Ω	
Readback Accuracy (23±5℃)	Vin/Rset*0.01%+0.2% I.F.S	
Readback Resolution	0.01Ω	
Readback Accuracy(23±5℃)	Vin/Rset*0.01%+0.2% I.F.S	
External Analog Programming		
Voltage Range	0~10V corresponding to rated output voltage	
Current Range	0~10V corresponding to rated output current	
Power Range	0~10V corresponding to rated output power	
Voltage Accuracy	0.2%F.S.	

Current Accuracy	0.2%F.S.	
Power Accuracy	0.5%F.S	
Line Regulation		
Voltage	≤0.01%F.S.	
Current	≤0.05%F.S.	
Load Regulation		
Voltage	≤0.02%F.S.	
Current	≤0.05%F.S.	
Dynamic Characteristic		
Max.Voltage Rise Slew Rate	40V/ms	40V/ms
Max.Voltage Fall Slew Rate	40V/ms	40V/ms
Voltage Fall Time（no load）100%-0	≤650ms	≤2000ms
Voltage Rise Time（no load）10%-90%	≤30ms	≤45ms
Transient Recovery Time	The recovery time of load varying 10%~90% and voltage recovering within 0.75% accuracy range of rated value is within 2ms.	
Others		
Parallel	Support Max.10 units same parameter device master-slave parallel connection	
Communication Interface	Standard LAN,RS232,Optional GPIB/USB/RS485/CAN communication	
Communication Protocol	SCPI/MODBUS-RTU/CAN-Open	
Response Time	≤2ms	
AC Input		
Input	Three phase , Please refer to the voltage mark at the rear panel.	
Efficiency	93%（typical）	
Power Factor	0.99（typical）	
Operating Environment		
Temp.specification	Operating Temp.：0℃~ 40℃； Storage Temp.：-20℃~ 70℃	
Environment	Altitude:＜2000m；Relative Humidity：5% ~ 90%（non condensing）；Air Pressure：80kPa ~ 110kPa	
Dimension（mm）	132.5(H)*482.0(W)*752(D), include the protective cover	
Net weight	≈35kg	