User Manual

N8361F Series Bipolar Programmable DC Power Supply

Version: V20231218

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1 Preface

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 N8361F series programmable 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 N8361F, please read this manual carefully, especially the safety instructions.

Please keep this manual for future use.

2 Safety Instructions

In the operation and maintenance of the instrument, please strictly comply with the following safety instructions. Any performance regardless of attentions or specific warnings in other chapters of the manual may impair the protective functions provided by the instrument.

TOYOTECH shall not be liable for the results caused by the neglect of those instructions.

2.1 Safety Symbols

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

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

2.2 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 N8361F's rated range.

3 Inspection & Installation

3.1 Inspection

After receiving N8361F, 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 N8361F chassis is damaged or has abnormal operation, please contact our authorized distributor or TOYOTECHTOYOTECH.

3.2 Connection to Power Cord

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

Warnings

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

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

3.3 Power-on Inspection

Warnings

1. Before connecting the power cord, please make sure that the power supply voltage matches the rated power supply voltage of this instrument.
2. To prevent electric shock and fire, use the power cord supplied by us.
3. To prevent electric shock, be sure to take protective grounding. Connect the power cord to a three-pronged socket with a protective earth terminal.

When the device cannot start normally, please try the following solutions:

1. Check whether the power cord is connected properly, whether the device has been powered normally, and whether the equipment switch is turned on;
2. Check whether the fuse is blown, if the it is, then please replace it with the same specification type fuse to avoid causing accidents.

Table 2

Model	N8361FSeries
Specification	250V/16A/20×5/Ceramic

The fuse replacement can be performed as follows:

1. Turn off the instrument and remove the power cord.

2. Insert a small screwdriver into the groove at the power socket and gently pry out the fuse holder.

3. Remove the fuse and replace it with one of the specified size.

Warnings

To ensure operator safety, disconnect power to the instrument before replacing the fuse.

3.4 Wiring

Precautions before connection

1. N8361F series front and rear panel terminals cannot be used at the same time.
2. Turn off the output of the device to prevent electric shock during the connection.
3. Plug into the power socket with protective grounding.
4. Ensure that the output wire is securely connected. Tighten the fixing screws to prevent the wire from falling off or loosening.
5. Turn off the channel output when changing the output connection.

3.4.1 Local Sense Wiring

Please connect the DUT to OUTH & OUTL terminals at the rear panel or positive & negative(red&black) terminals at the front panel.

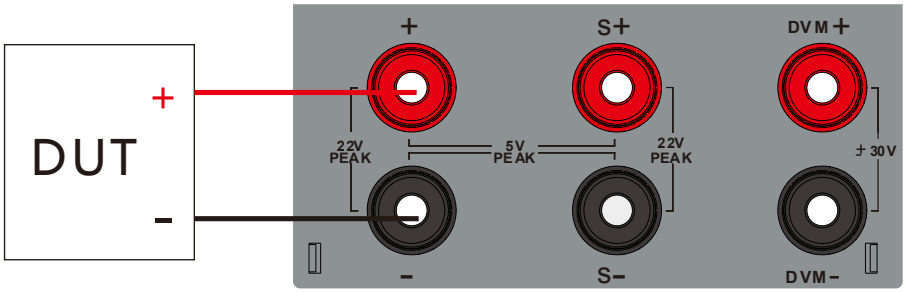

Figure 1 local sense at front panel

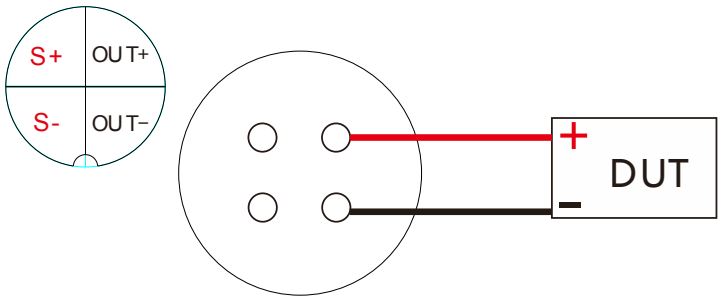

Figure 2 local sense at rear panel

3.4.2 Four-Wire Remote Sense Wiring

Remote sense can compensate for the voltage drop on the lead between output terminal of battery simulator and DUT.

The steps for connection are as follows.

1. Please use a sense wire to connect the DUT to S+ and S- at the rear panel.
2. Please use a test lead to connect the positive & negative(red&black) terminals.

The remote sense wiring at front panel is shown below.

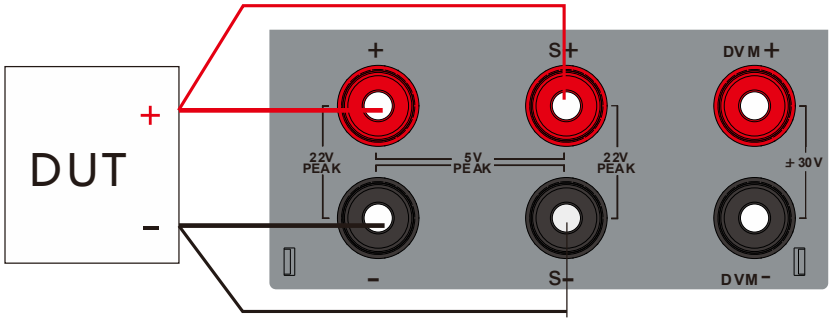

Figure 3 Front panel four wire remote sense wiring

The steps for connection are as follows.

3. Please use a sense wire to connect the DUT to S+ and S- at the rear panel.
4. Please use a test lead to connect the DUT to OUT+ and OUT- at the rear panel.

The remote sense wiring at rear panel is shown below:

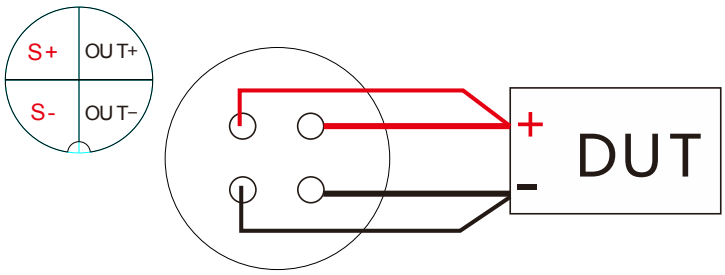

Figure 4 Rear panel four wire remote sense wiring

Warning

Users should set S/Mode to Remote while using four-wire remote sense.

3.4.3 DVM Measurement Wiring

N8361F series battery simulator has a built-in DVM(digital voltmeter)to measure DC voltage. Figure 5 and 6 show DVM cable connections.

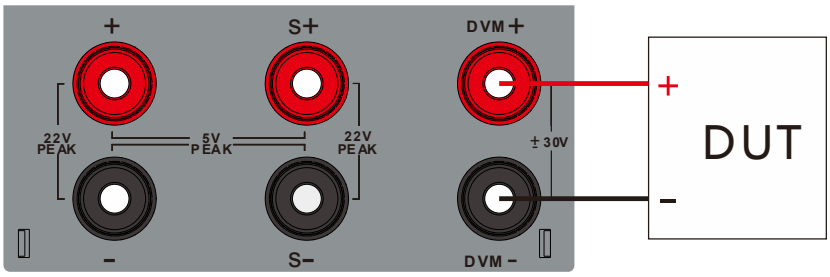

Figure 5 Front panel DVM wiring

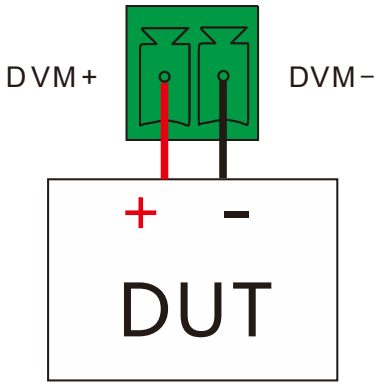

Figure 6 Rear panel DVM wiring

4 Product

4.1 Brief Introduction

The N8361F is a programmable DC power supply with bipolar voltage output and bidirectional current flow that operates over the entire area from Quadrant I to Quadrant IV. The N8361F is capable of fast response with voltage rise and fall times of ≤50μs, current accuracy of up to 1μA, and is characterized by high accuracy, high stability and high flexibility. It can be used in applications requiring positive and negative voltage supply, such as analog circuits, laboratory equipment, electronic component testing and automotive electronics ground drift testing.

Features

- -20V~+20V Bipolar power supply, voltage output range: -20V~+20V
- Current flows in both directions, both source and load
- Current Range: -10A~+10A, power 200W
- Fast Response: voltage rise and fall time ≤ 50μs
- High Accuracy: Voltage Accuracy: 0.01%+2mV; Current accuracy up to 1μA
- High-accuracy DVM
- SEQ Test: support automated test to improve test efficiency
- Front and rear outlet design, convenient for desktop and integrated use
- 4.3-inch LCD screen to display status information
- LAN/RS232/CAN communication
- Digital I/O, support trigger test

4.2 Dimension

N8361F Series dimension: 88.0mm(H)*214.0mm(W)*398.0mm(D)

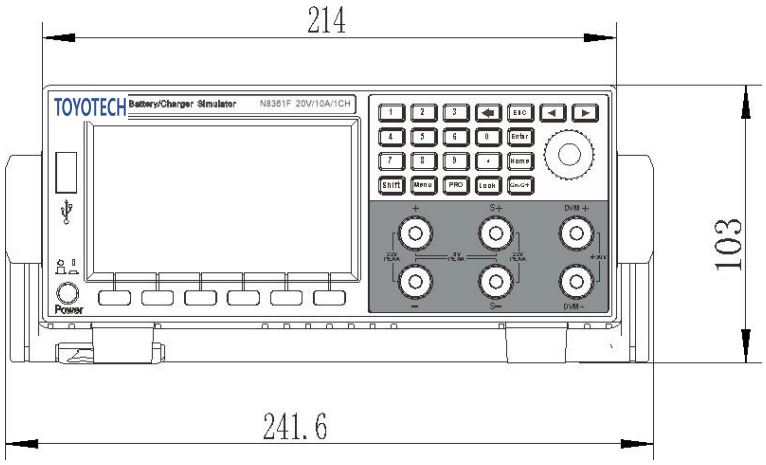

Figure 7 Front Panel Dimension(mm)

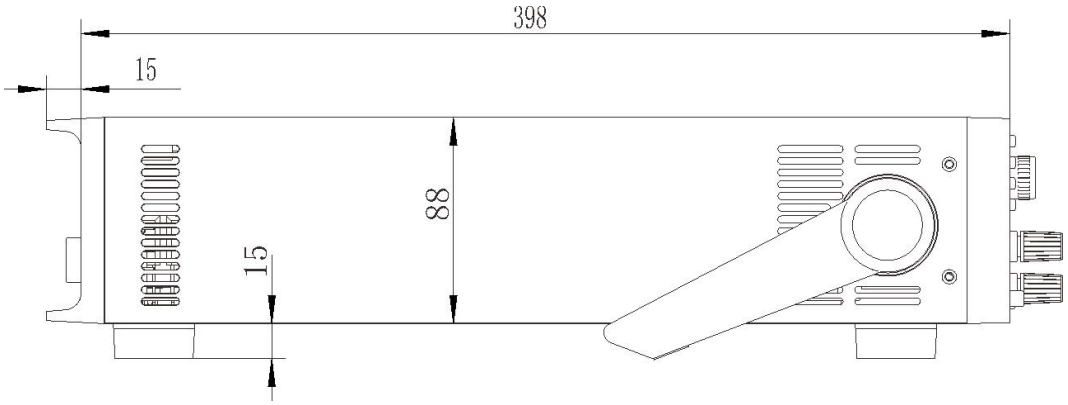

Figure 8 Side Dimension(mm)

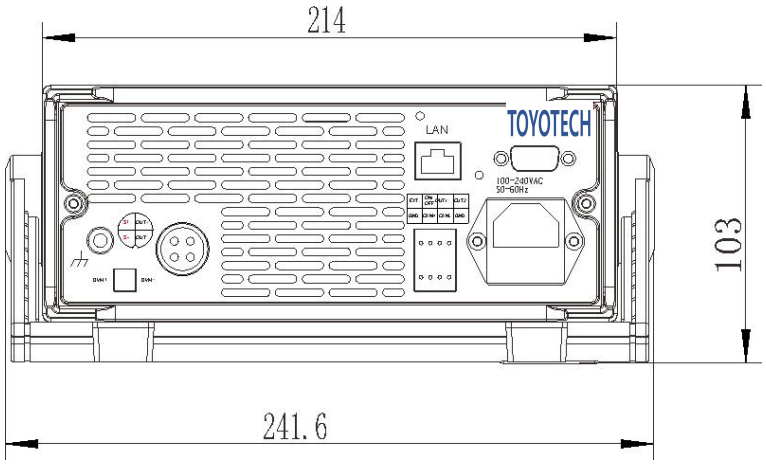

Figure 9 Rear Panel Dimension(mm)

4.3 Front Panel Introduction

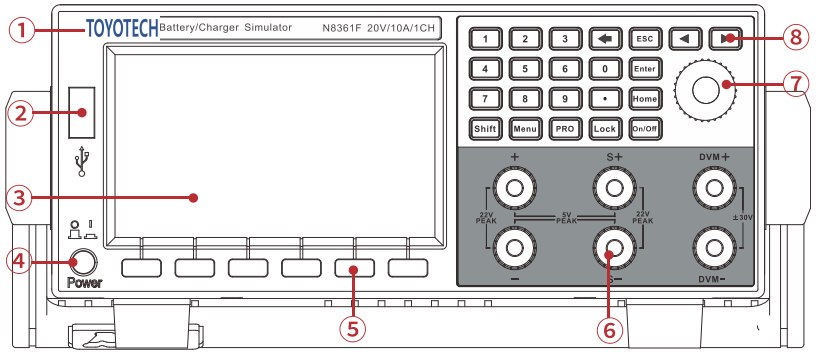

Figure 10 Front Panel

Table 3

Number	Name	Function
1	Device model	Displaying model number
2	USB Port	USB Storage
3	LCD Screen	Displaying data
4	Power switch	Power control
5	Buttons	Operation mode and parameter setting
6	Output terminal	Front panel Output/Input wiring terminal
7	Knob	Set the parameter
8	Button	For the details,please refer to the follow introduction

4.4.1 Button & Knob

Users can control N8361F via button and knob.

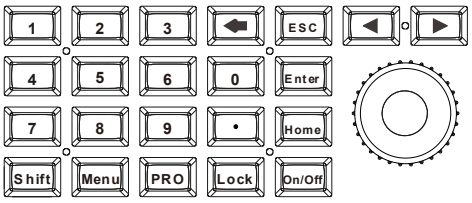

Figure 11 Button & Knob

Table 4

Number	Name
0 ~ 9 , •	Numeric buttons
⬅	Delete button
Shift	Second function Switch key, hold down this key to start screenshot.
Menu	Menu or system setting
PRO	Protection
Lock	To lock/unlock
On/Off	To turn on/off the power output for the selected channel
Home	Source mode
Enter	To enter the required item, confirm the input
ESC	To exit from setting
◀ ▶	1.To shift or select the required item in menu 2.To control the cursor scrolling when setting parameter

4.4.2 Knob

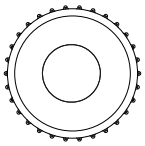

Figure 12 Knob

The functions are described as follows:
1. adjust the value setting;
2. Select menu item/parameter item;
3. Confirm the set value or select the menu item/parameter item.

Adjust value setting

In the value setting interface, turn the knob clockwise to increase the value, turn the knob counterclockwise to decrease the value.

Select menu item/parameter item

The knob can be used to select menu items/parameter items. On the display interface, turning the knob clockwise indicates that the next menu item/parameter is selected, and turning the knob counterclockwise indicates that the previous menu item/parameter is selected.

Confirm Settings

After setting a value or selecting a menu item, press the knob to perform the confirmation action.

4.4.3 Front Panel Channel Terminals

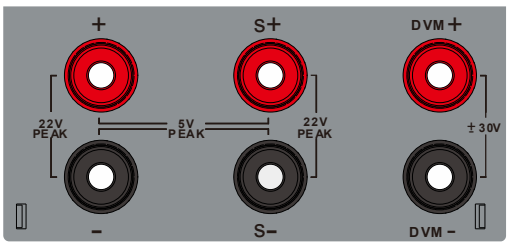

Figure 13 Front Panel Channel Terminals

Table 5

Number	Description
+	Positive input/output terminals
-	Negative input/output terminals.
S+	Positive sampling terminal.
S-	Negative sampling terminal.
DVM+	DVM Positive terminal.
DVM-	DVM Negative terminal.

Warning

The maximum input/output voltage between （+）（-）channel terminals is product specification voltage *1.5.

The maximum input/output current between （+）（-）channel terminals is the product specification current

4.5 Rear Panel Introduction

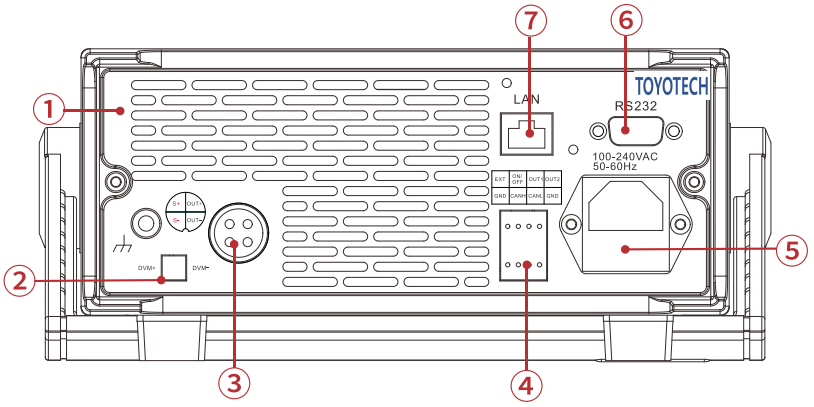

Figure 14 Rear Panel

Table 6

Number	Name	Function
1	Air outlet	Exhaust outlet, cooling
2	DVM Terminal	DVM measurement
3	Channel interface	Channel output
4	Trigger/CAN interface	For remote control/Trigger
5	AC power socket	AC input power
6	RS232 interface	For remote control
7	LAN port	For remote control

4.5.1 Channel Interface

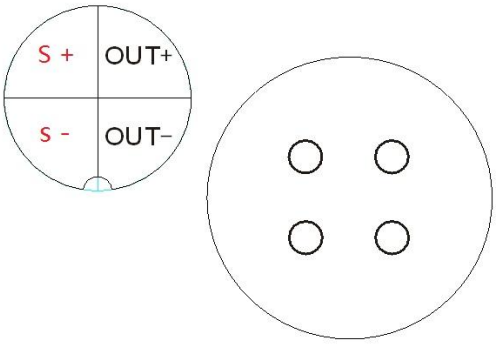

Figure 15 Channel Interface

When the instrument outputs a high current, a voltage drop occurs on the output wire. In order to ensure the measurement accuracy, N8361F adopts the four-wire output mode to compensate the wire voltage drop.

Table 7 Pin Definition

Symbol	Definition
OUT+	Four-wire system output +
OUT-	Four-wire system output -
S+	Four-wire system sense +
S-	Four-wire system sense -

Notes

The maximum limit of the output/input voltage between the channel interface (+) and (-) is the rated voltage*1.5.

The maximum limit of the output/input current between the channel interface (+) and (-) is the rated current.

4.5.2 DVM Measurement Terminals

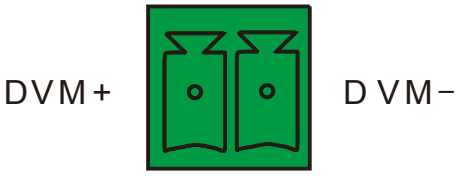

Figure 16 DVM Measurement Terminals

Table 8

Name	Function
DVM+	DVM Positive Terminal
DVM-	DVM Negative Terminal

4.5.3 RS232 Interface

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

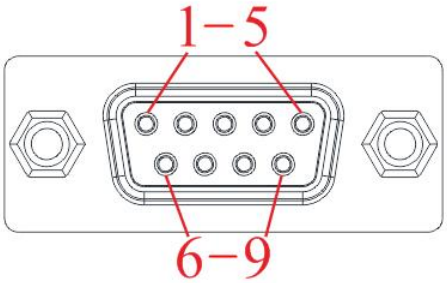

Figure 17 RS232 Interface

Table 9 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

4.5.4 LAN Port

LAN port is a default communication port for N8361F. The Ethernet cable is a standard accessory.

Steps for remote control via LAN port:

1. Check if N8361F 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 N8361F LAN port.
5. Check if the indicator light at LAN port on N8361F: green light always on, orange light flashing.

4.5.5 Trigger/CAN Interface

N8361F is equipped with a CAN bus interface.

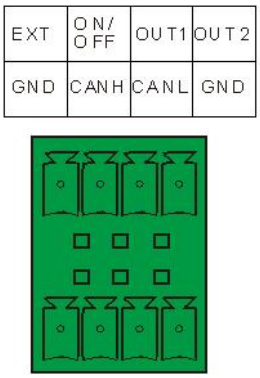

Figure 18 Trigger/CAN Interface

This terminal block is used for external trigger and CAN communication control.

Table 10

Name	Function
EXT	External trigger signal input, compatible with 5V TTL level.
ON/OFF	Battery simulator ON/OFF output signal, ON for output high level.
OUT1	NC
OUT2	NC
GND	Ground
CANH	CAN _H signal cable
CANL	CAN_L signal cable
GND	Ground

4.5.6 Default Communication Parameter

Table 11

Parameter	N8361F Series Default Value
Default IP Address	192.168.0.123
Default Baud Rate	115200

4.6 Remote Mode

The Remote Mode interface is shown below.

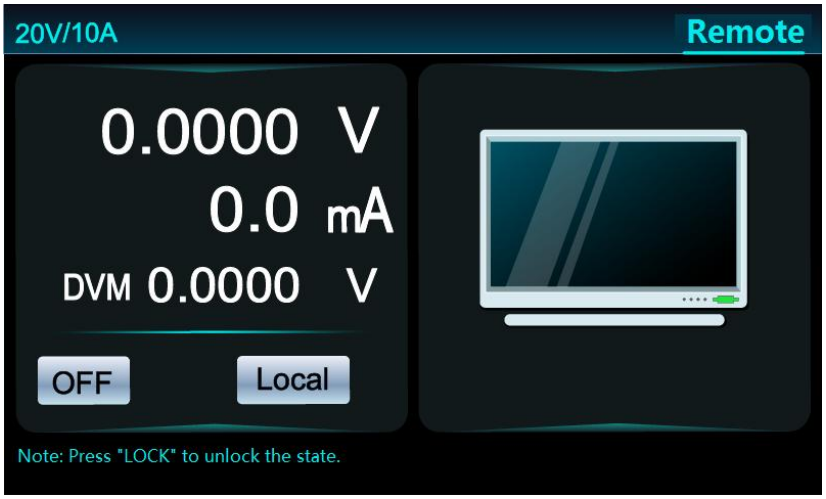

Figure 19 Remote Mode

Notes

When the device is disconnected from the computer, you need to press the "Lock" button to unlock the device.

5 Operation

After the device is switched on, it will enter Source mode directly. Users can enter menu by pressing [**Menu**].

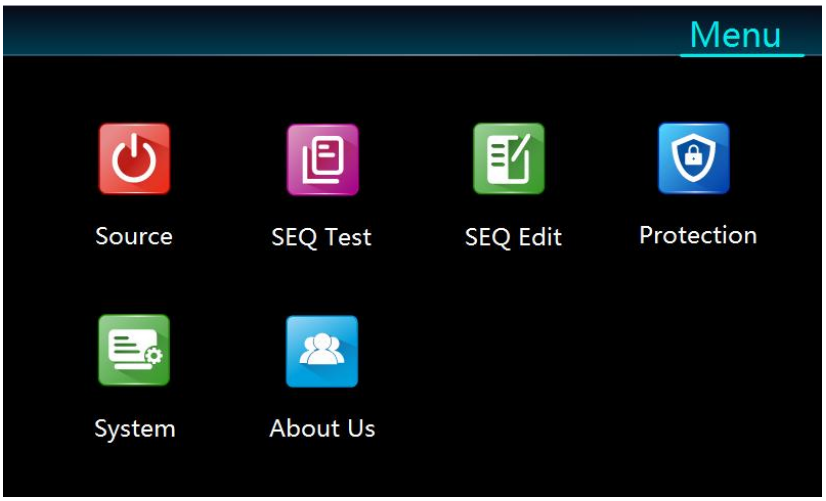

Figure 20 Menu

This chapter mainly describes the following functions of N8361F.

- **Source**
- **SEQ Edit**
- **SEQ Test**
- **System**
- **Protection**
- **System**
- **About Us**

5.1 Interface

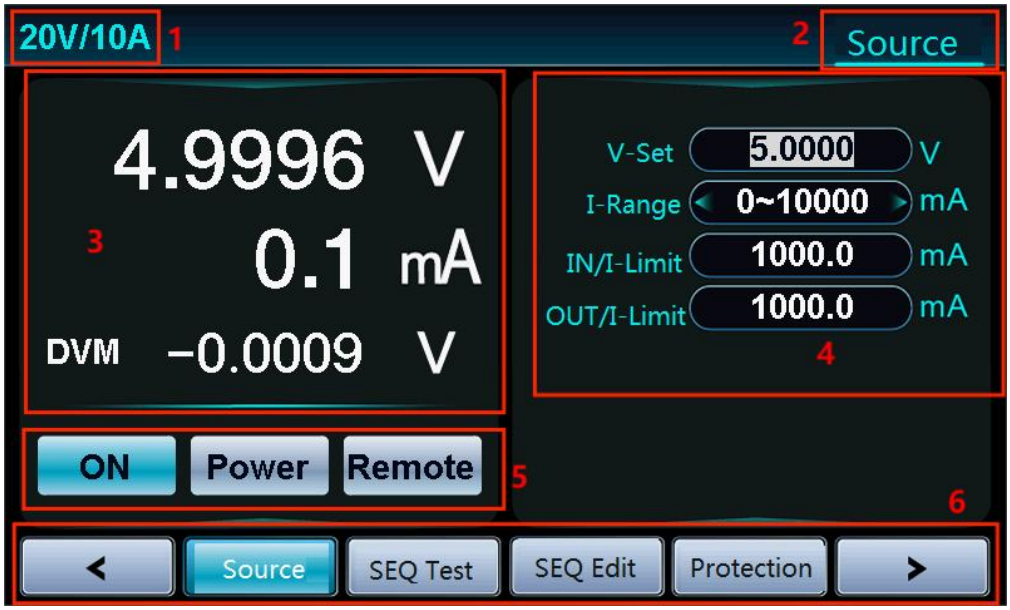

Figure 21 Interface Introduction

Table 12

No.	Instruction
1	Specification
2	Function selection
3	Readback area, including voltage, current, power, capacity, temperature, and DVM Value. Please press [**Shift**] first, release the button and then press ◄► to switch the parameters.
4	Parameter setting area
5	Function mode
6	Function selection

5.2 Source Mode

After powered on, it enters Power Mode by default and provides power supply and DVM measurement.

Press the Power Mode key or select Power Mode from the Menu to enter the screen, as shown in Figure 22.

1. Press the **Source** to enter the interface or rotate knob on the front panel, and press **Enter** to enter the interface；
2. V-Set: Input through the numeric keys, and press **Enter** to confirm;
3. I-Rang： current readback range is divided into four ranges: 0~1mA, 0~1000mA, 0~10000mA, and Auto, when set to Auto range, readback current range will automatically switch the range, press **Enter** to confirm;
4. I/I-Limit: Set the range of 0 to rated value, input through the numeric key, press **Enter** to confirm;
5. OUT/I-Limit: Set range is 0 to rated value, input through the numeric key, press **Enter** to confirm;
6. Press **On/Off** , the display channel status is ON, as shown in Figure 22.

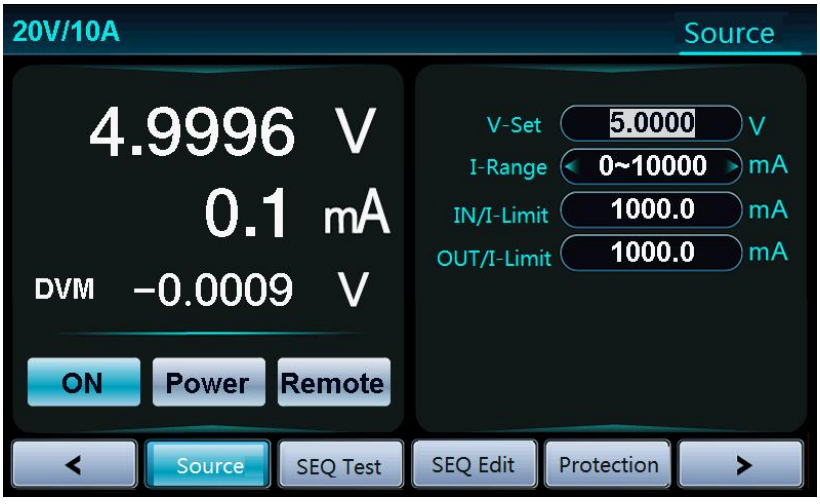

Figure 22 Source Mode

7. Press **On/Off** , the display channel status is off, which means the testing finished.

5.3 SEQ Edit

5.3.1 Function

Multiple steps can be edited under SEQ Edit. The maximum SEQ files are 10 files with range 1-10. The maximum steps are 200 steps. Constant voltage value, output current limit, input current limit, resistance value and dwell time can be set for each step. Links can also be made between steps. The corresponding cycle times can be set independently.

N8361F judges the number of running steps based on the selected SEQ file. It will run all the steps in sequence, according to the preset output parameters for each step.

5.3.2 Operation

- SEQ File No.

It refers to the work step file executed when the device is running. Settable range is 1-10.

- Total Steps

It refers to the total steps executed when the device is running. Settable range is 1-200.

- File Cycle Times

It refers to the cycle times the SEQ file should run. Settable range is 0-9999.

- Step No.

After setting the step number, users can set corresponding parameters. Settable range is 1-200.

- Constant Voltage

Settable range is from 0 to rated voltage.

■ Input/Output Current Limit

The settable range of IN/I-Limit or OUT/I-Limit is from 0 to rated current. The actual input/output current will not exceed the setting value.

■ Dwell Time

It refers to the running time for the specific time. Settable range is 0-100.000s.

■ Link Start Step No.

Settable range is -1-199. -1 means no link. When this parameter is set to zero or the same value of Step No., it means Link Start Step is same as Step No.

■ Link Stop Step No.

Settable range is -1-199. -1 means no link. When this parameter is set to zero or the same value of Step No., it means Link Start Step is same as Step No.

■ Link Cycle Times

It refers to the cycle times the link step should run.

Example:
For editing Step No. 3, Link Start Step is set to 1, Link Stop Step is set to 2, Link Cycle Times is set to 2. It means after reaching dwell time of step 3, it will run from step 1 to step 2 for twice .

Figure 23 SEQ Edit

Note:

1. For sequence work step, the positive and negative voltage switching time should be 50ms (the first work step for unilateral negative voltage should be greater than 50ms), and the work step running time should be set to be greater than 50ms (work step running time = single step delay time - positive and negative voltage switching time);

2. SEQ mode - work step is unilateral negative voltage - the first work step needs to be greater than 50ms, and the running time of the rest of the work steps can be set to a minimum of 1ms;

3. SEQ mode - work step is unilateral positive voltage - dwell can be set at least 1ms;

4. Each SCPI instruction of sequence editing should run with a delay of ⩾50ms, otherwise the work step parameter will be lost.

5.4 SEQ Test

The sequence test mainly determines the step size according to the currently selected running file, and executes sequentially according to the output parameters of each step.

1. The user presses SEQ to enter the **SEQ Test** interface, or selects **SEQ Test** under the **Menu** to enter the interface;
2. File No.: input No. by numeric button, and press **Enter** to confirm;
3. To complete the test, press ON/OFF to turn off the output. The display currently shows OFF.

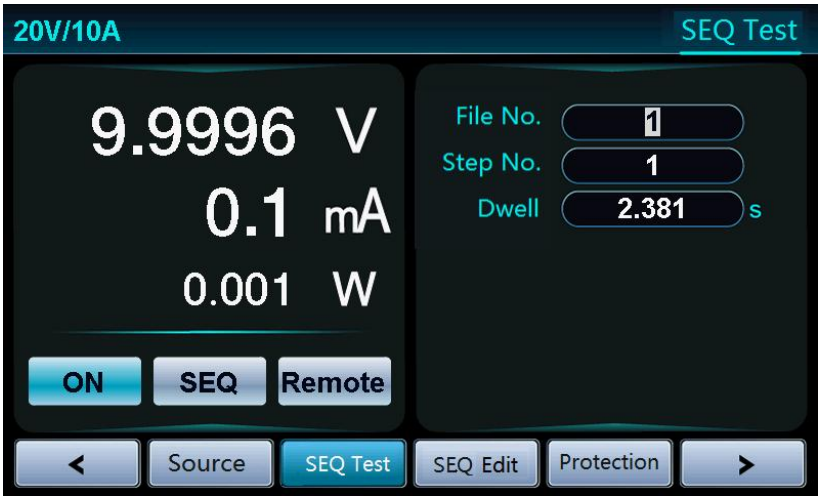

Figure 24 SEQ Test

Note

This operation is performed after the SEQ EDIT is complete.

5.5 Protection

Users can press the **Menu** and select **Protection** to enter the interface, the protection parameters can be set in the interface.

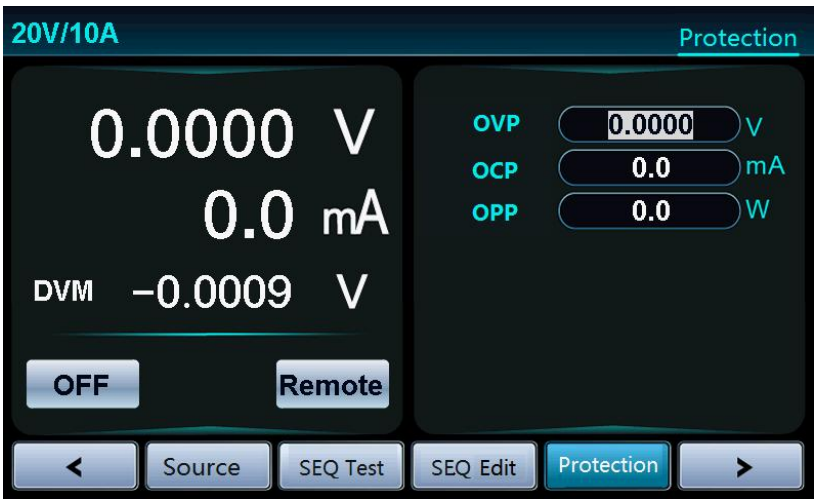

Figure 25 Protection

■ OVP

If the OVP is triggered, the maximum output voltage will be limited to the protection value, once the OVP is triggered, the output will be shut down immediately and the screen will display the OVP symbol.

■ OCP

If the OCP is triggered, the maximum output/input current will be limited to the protection value, once the OCP is triggered, the output will be shut down immediately and the screen will display the OCP symbol.

■ OPP

If the OPP is triggered, the maximum output power will be limited to the protection value, once the OPP is triggered, the output will be shut down immediately and the screen will display the OPP symbol.

Note

When the Protection parameter is 0, Table indicates that protection is turned off.

5.6 System

Selecting **System** from the Menu menu. Users can set related parameters on the system configuration screen, as shown in Figure 26：

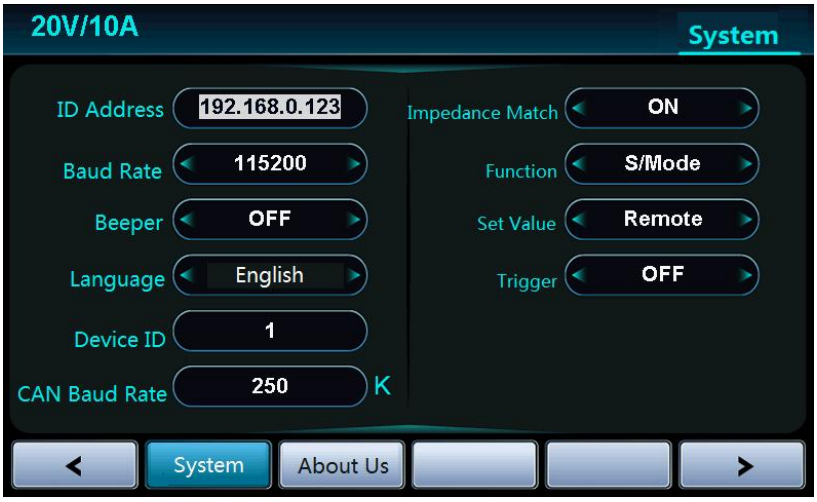

Figure 26 System

- IP Address

The default IP address is 192.168.0.123. Users can change the value. After the change is complete, the system restarts to take effect.

- Baud Rate

The N8361F supports a variety of baud rates. Users can select 9600, 19200, 38400, 57600, and 115200 as required. The changes take effect after being restarted.

- Beeper

This option can set the device key sound ON/OFF.

- Language

The N8361F supports Chinese and English display.

- Impedance Match

To turn on/off impedance matching In CAN communication

- Functional type includes S/Rate, F/Reset, S/Mode, DVM S/R

- Trigger

The external trigger function can be set ON/OFF. If the external trigger function is

enabled, and the input terminal (ON/OFF, GND) on the rear panel is connected to a high level (5V), the battery simulator is controlled to start the output. a high level (5V) will be output at the output terminals (OUT1, GND), indicating that the battery simulator is in the ON state.

Note:1. About the selection of function type, please users refer to the actual and combined with the on-screen instructions selected.

5.7 About Us

Users press **Menu** to enter and select **About Us** to enter the interface, press **Shift**, it will show the factory SN number and software version information of N8361F.

Figure 27 About Us

6 Application Software Installation & Configuration

6.1 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

6.2 Application Software Installation and Uninstallation

6.2.1 Installation

1) Find the installation program "N8361F_std_setup.exe" from the USB flash drive in accessory bag.
2) Make double-click on the file and begin installation.

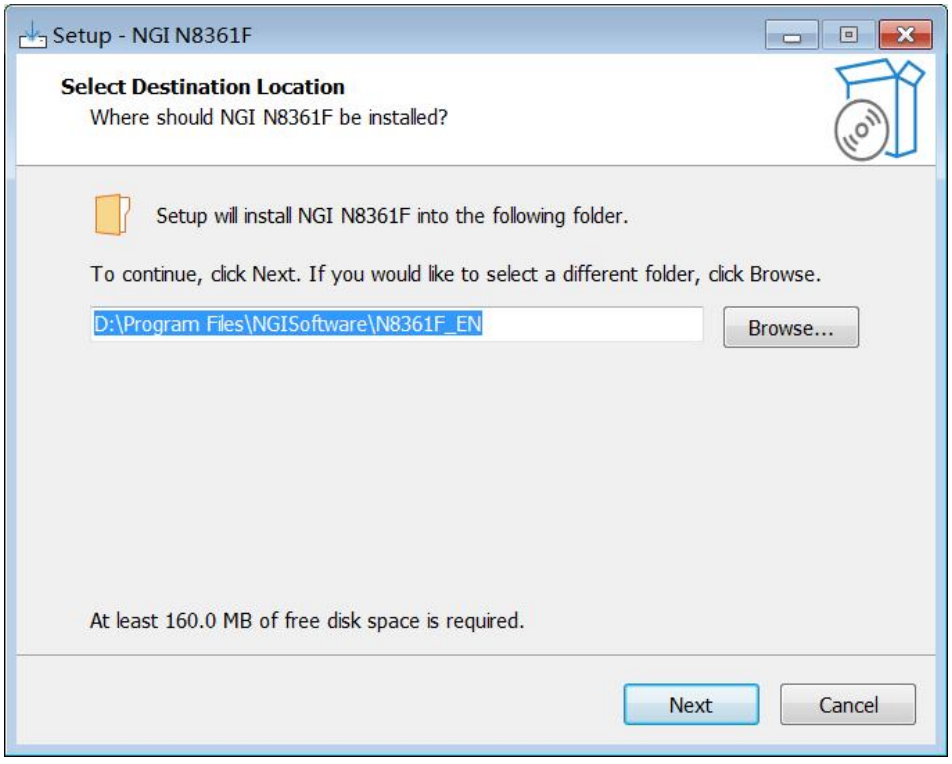

Figure 28 Program Installation

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

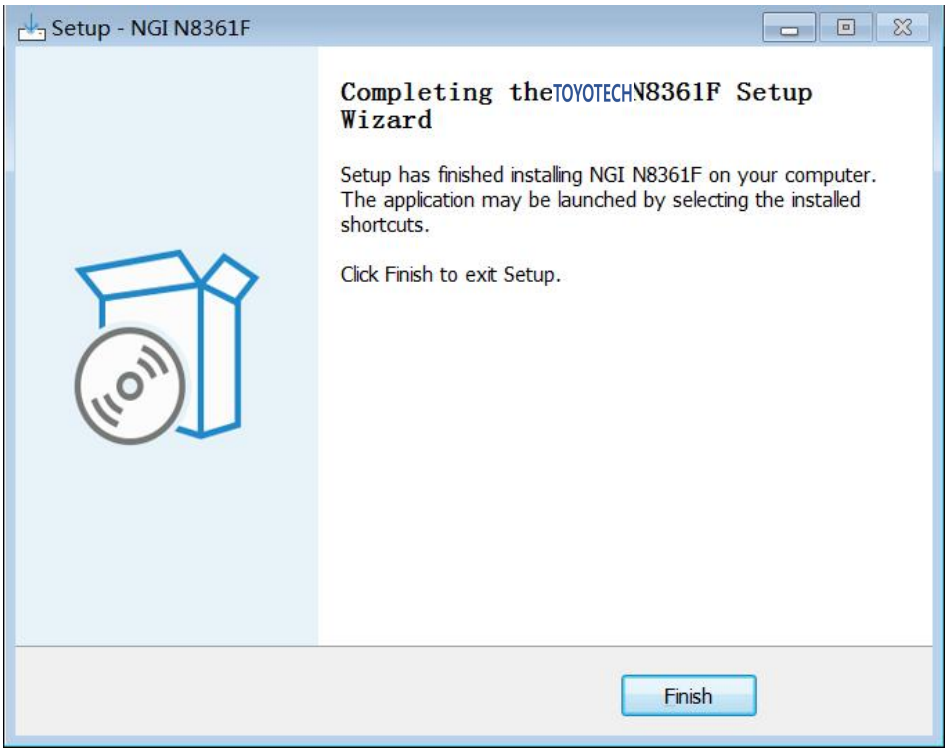

Figure 29 Installation Completed

6.2.2 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.

6.3 PC Connection

6.3.1 Port Connection

Please plug the Ethernet cable to PC Ethernet port and the other side to N8361F LAN port. After N8361F series is turn on, enter the system configuration interface to check the network IP. PC needs to keep the same network segment with N8361F in order to search the device.

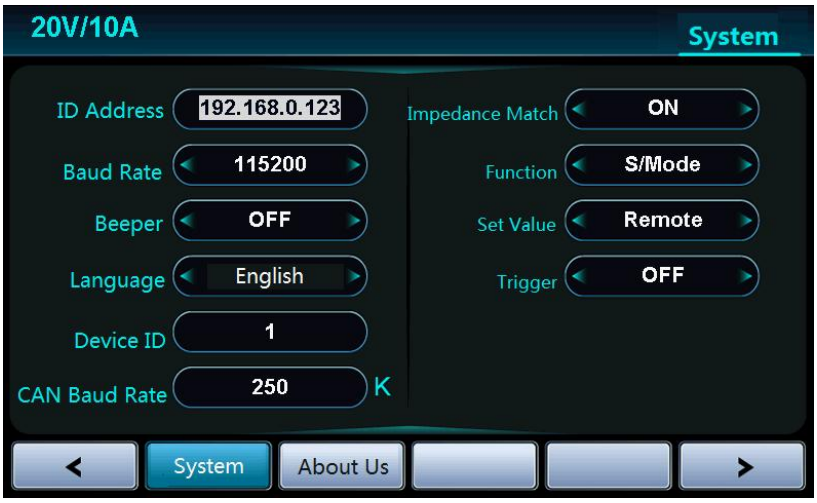

Figure 30 System interface

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

6.3.2 Disabling operating system standby mode

■ Windows 7 settings

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

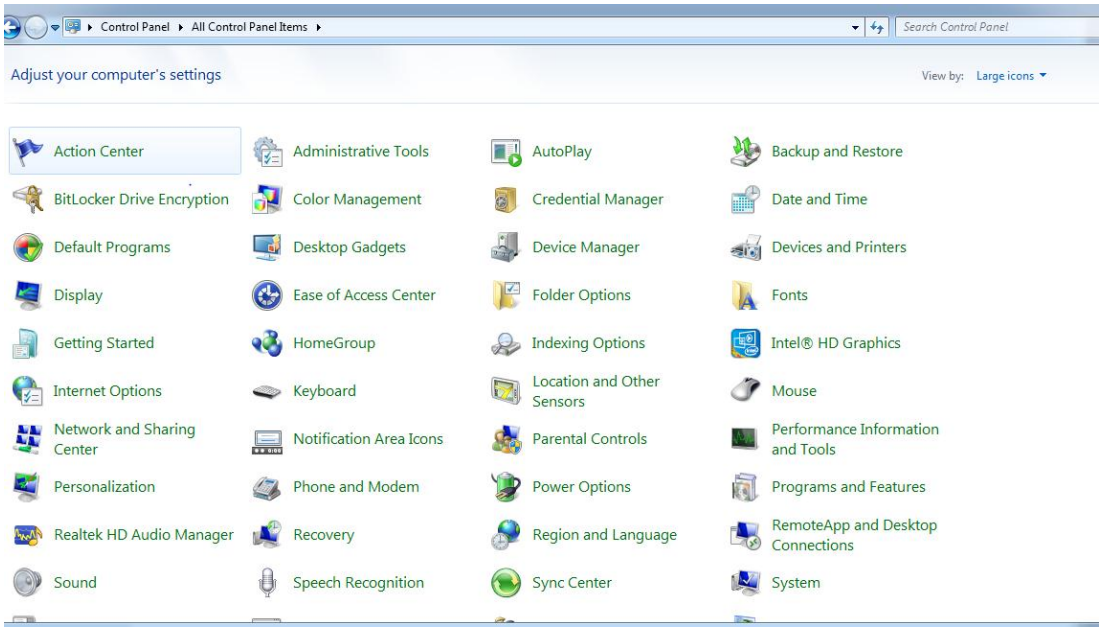

Figure 31 Windows 7 settings

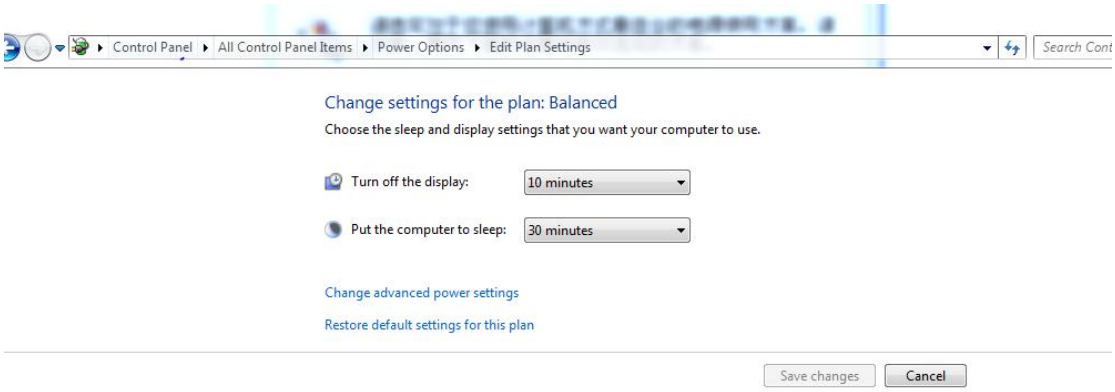

Figure 32 Windows 7 settings

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

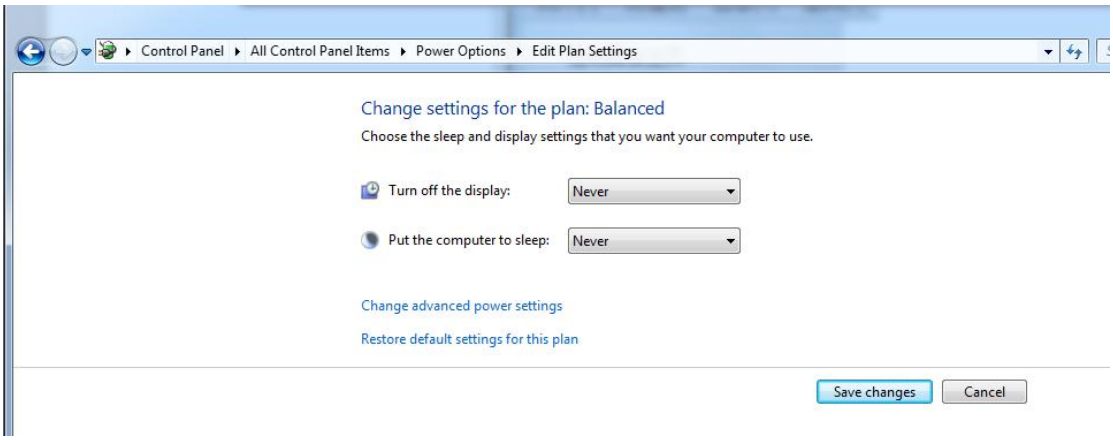

Figure 33 Windows 7 settings

■ Windows 10 settings

Click **Start**→Click **Settings**.

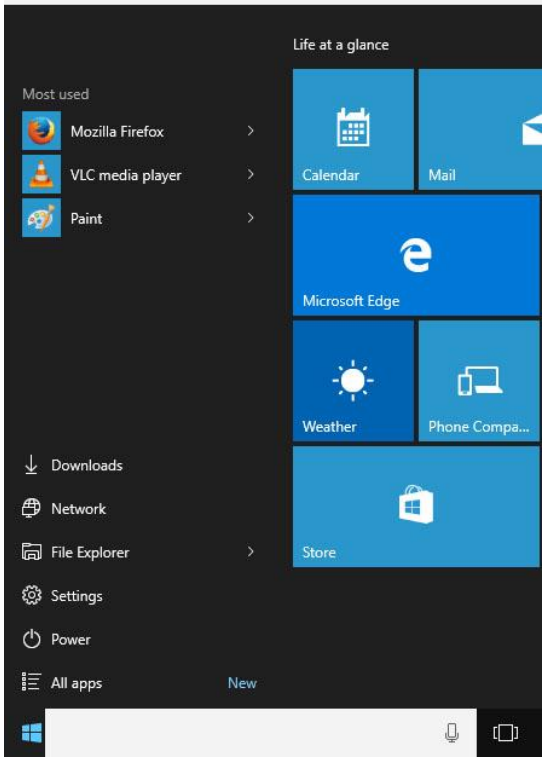

Figure 34 Windows 10 settings

Click **System**.

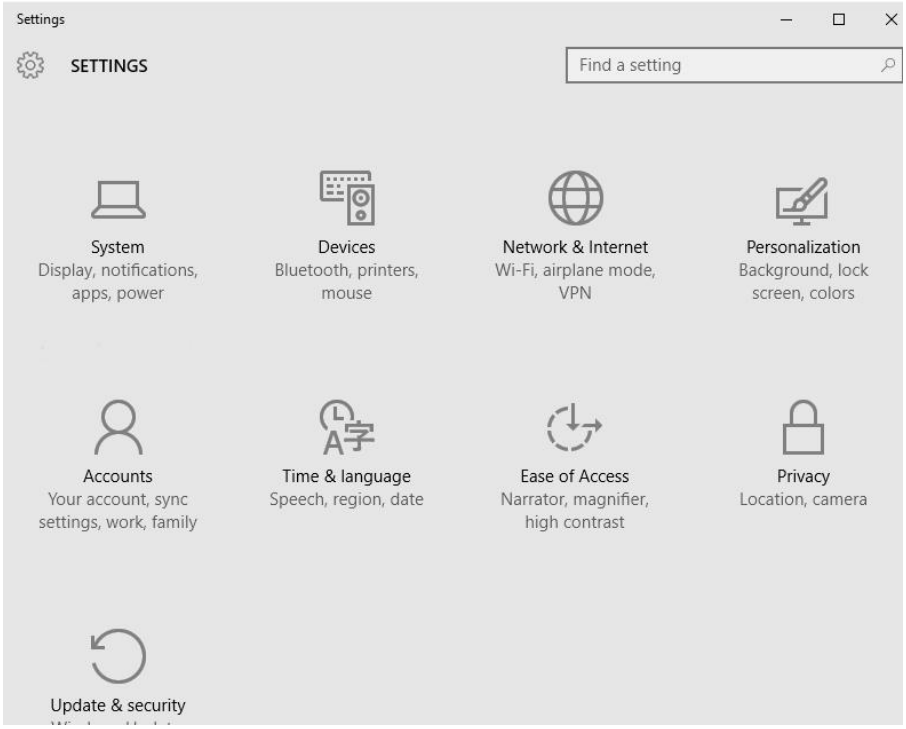

Figure 35 Windows 10 settings

Click **Power & sleep**.

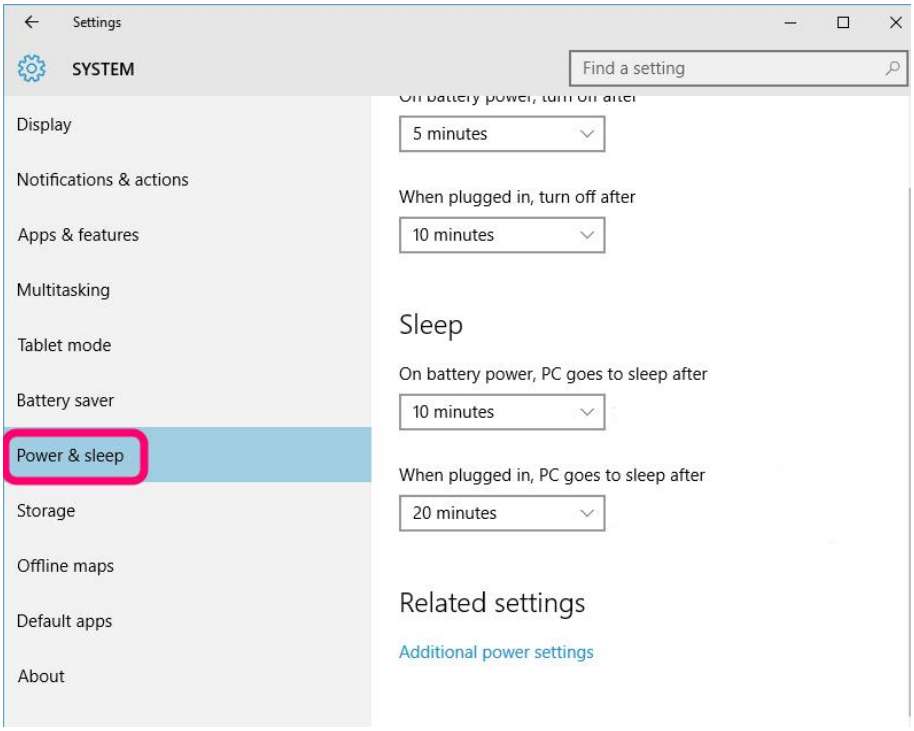

Figure 36 Windows 10 settings

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

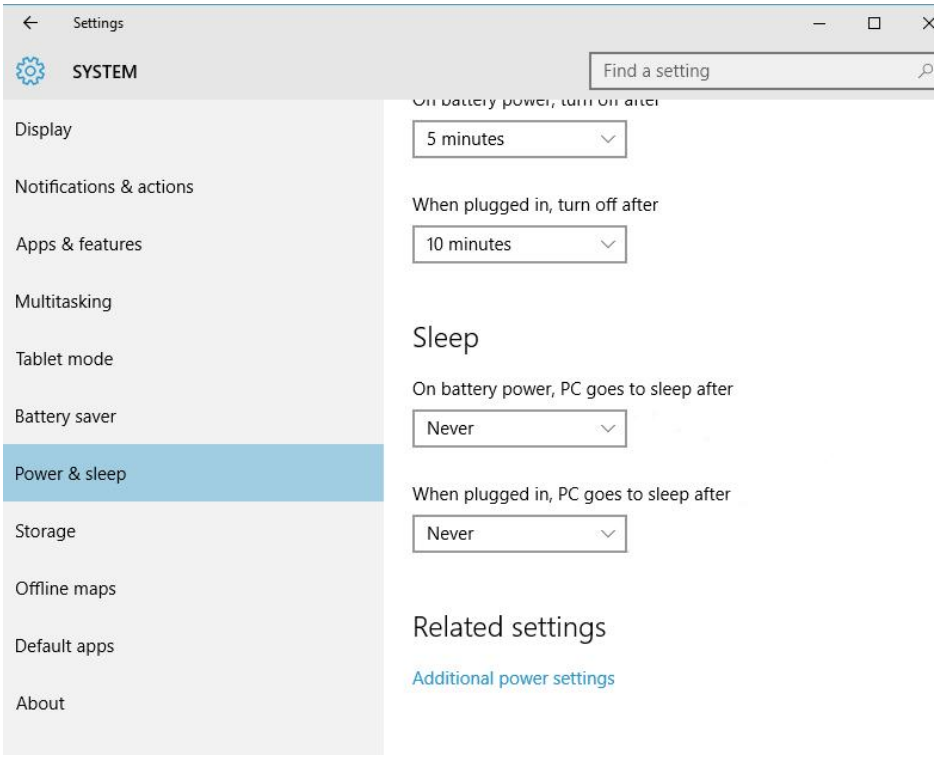

Figure 37 Windows 10 settings

6.3.3 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 N8361F. But IP addresses should be different.

■ Windows 7 Setting

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

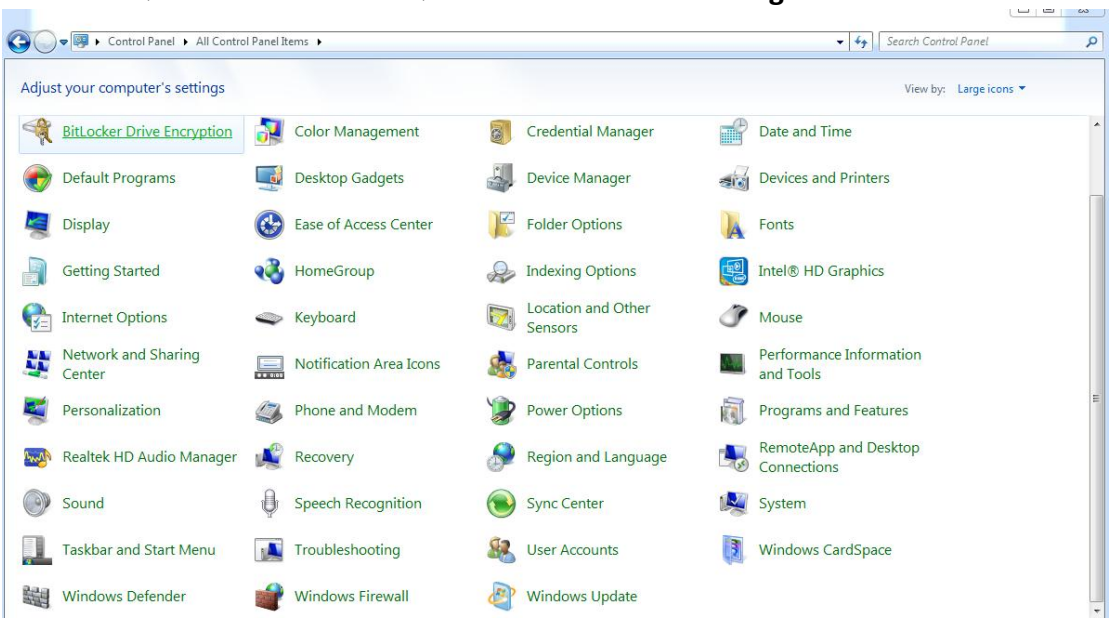

Figure 38 Network IP Address Setting

Click **Change adapter settings**.

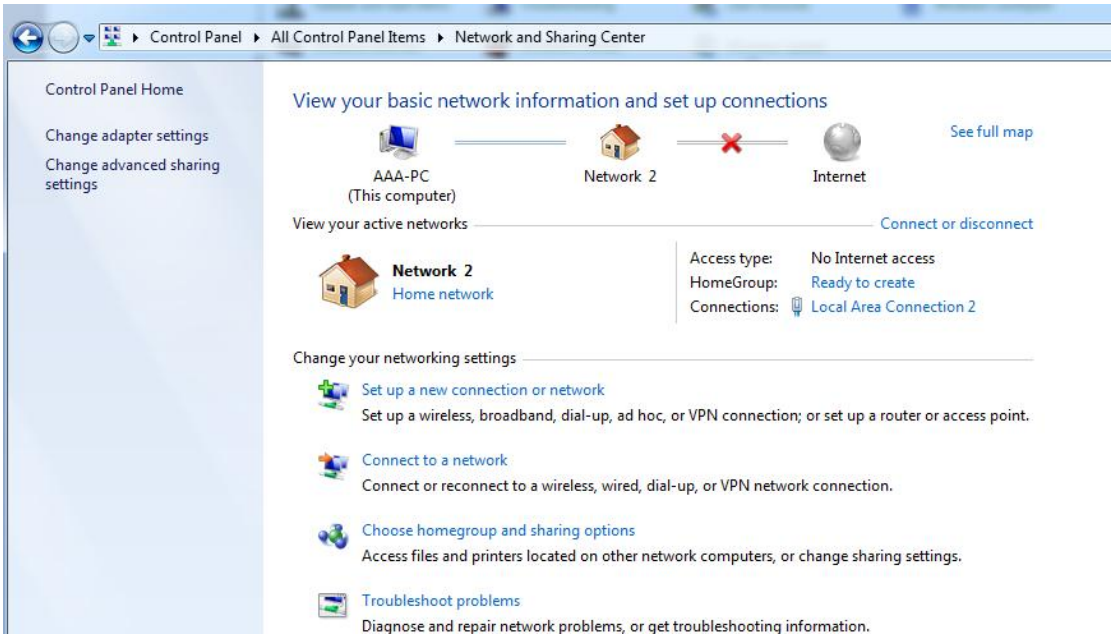

Figure 39 Network IP Address Setting

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

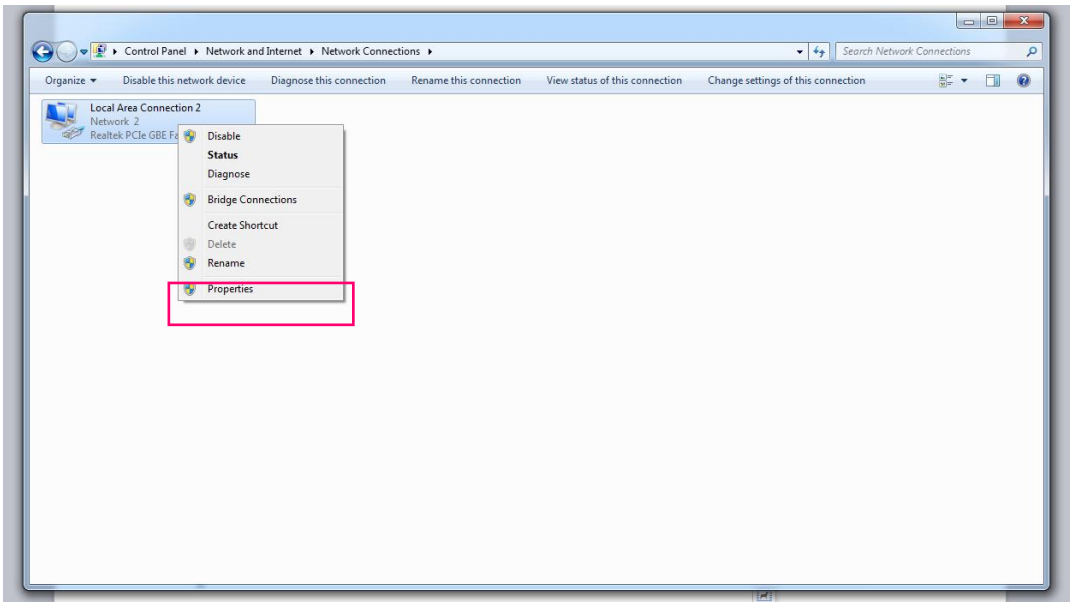

Figure 40 Network IP Address Setting

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

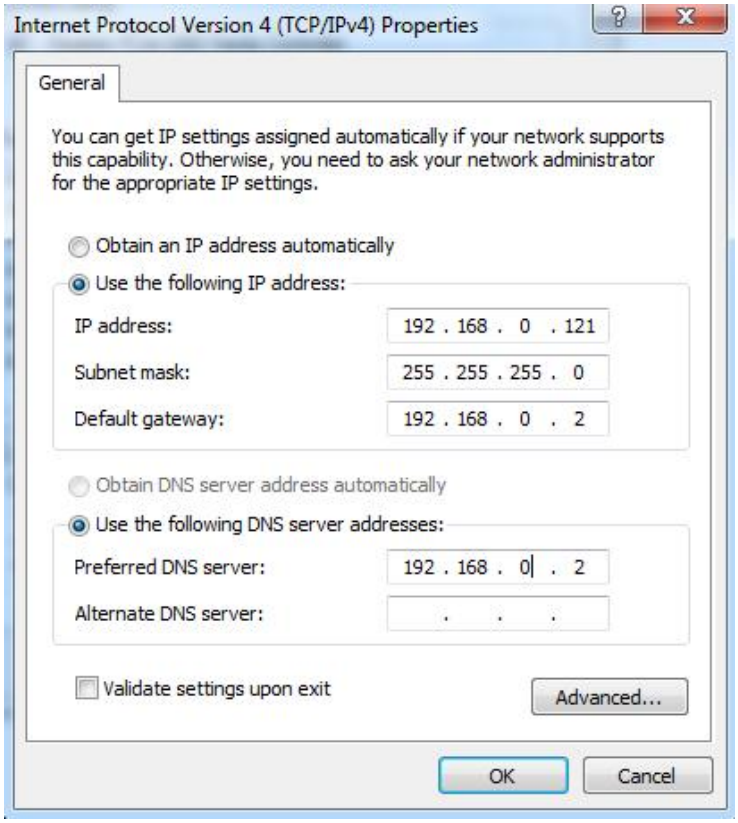

Figure 41 Network IP Address Setting

Click **Start**→Input **cmd**.

Input ping 192.168.0.123(default IP of N8361F) and check if N8361F can communicate properly.

Figure 42 Run Command

If communicating properly, the below information will be reverted.

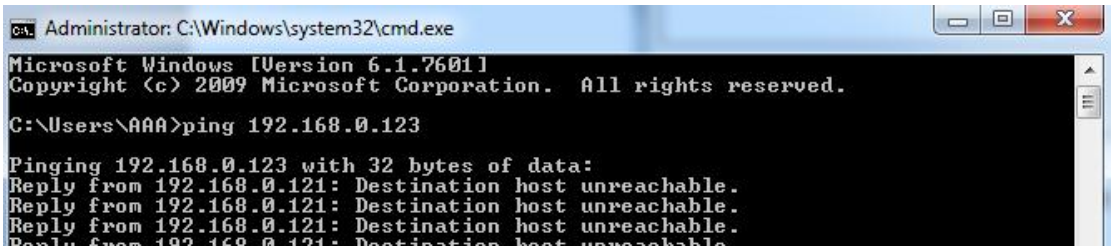

Figure 43 Communication Test

■ Windows 10 Setting

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

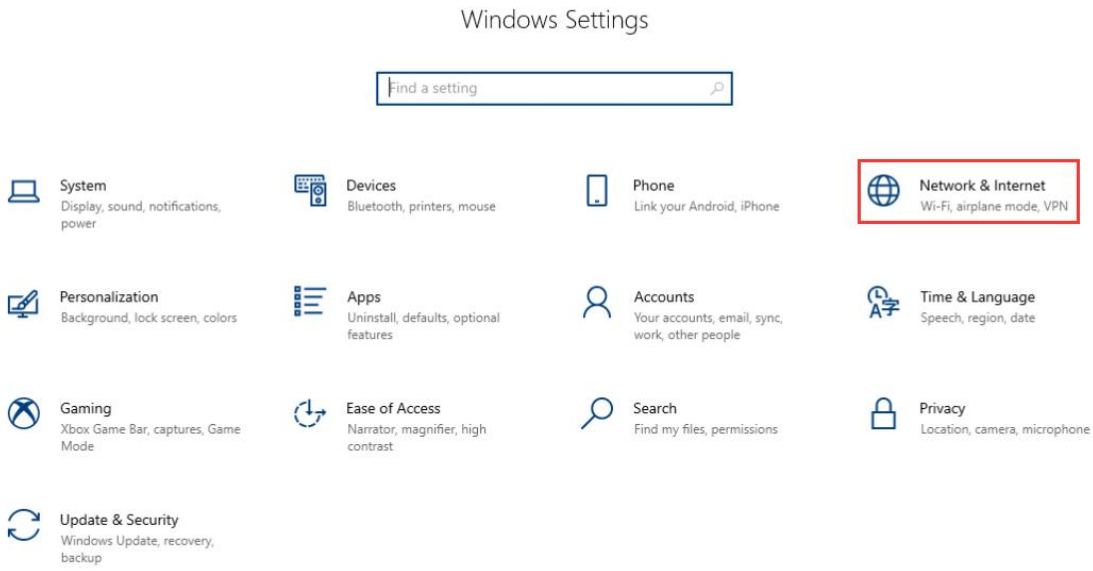

Figure 44 Network IP Address Setting

Click **Change adapter options**.

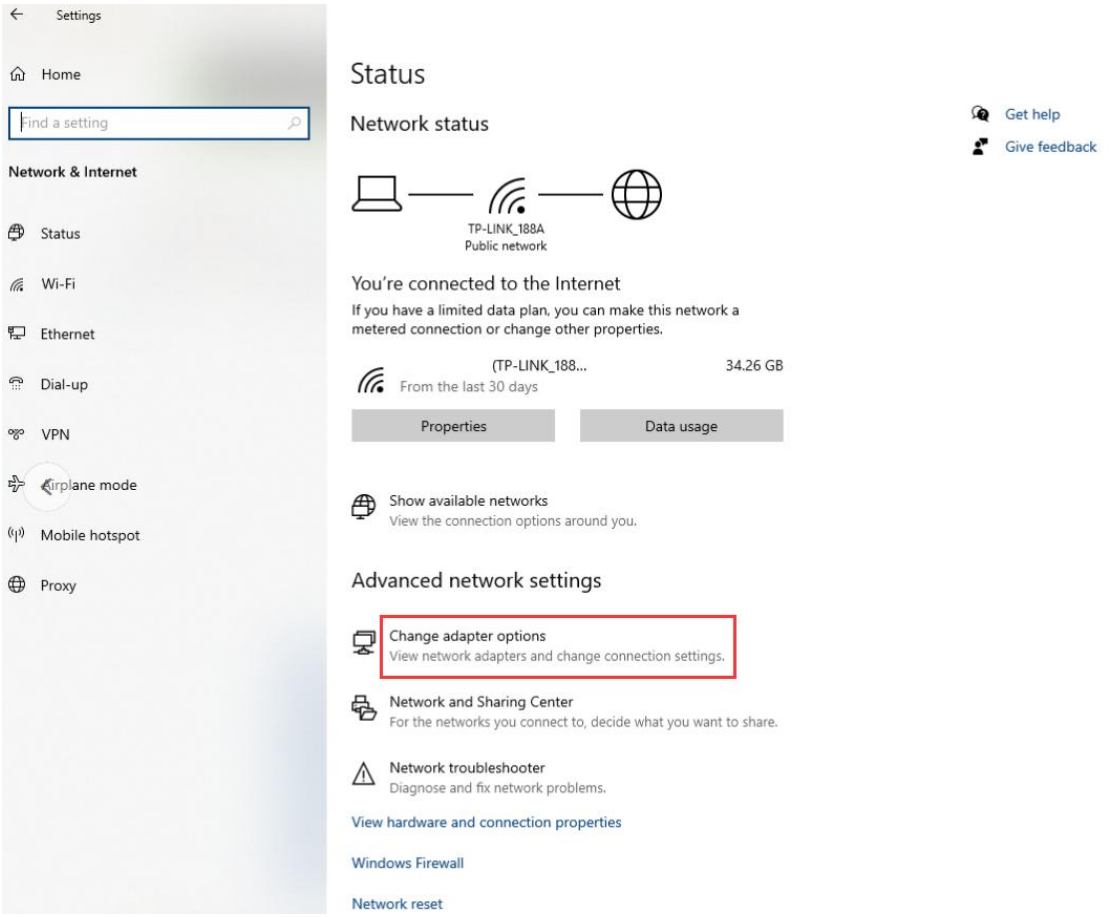

Figure 45 Network IP Address Setting

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

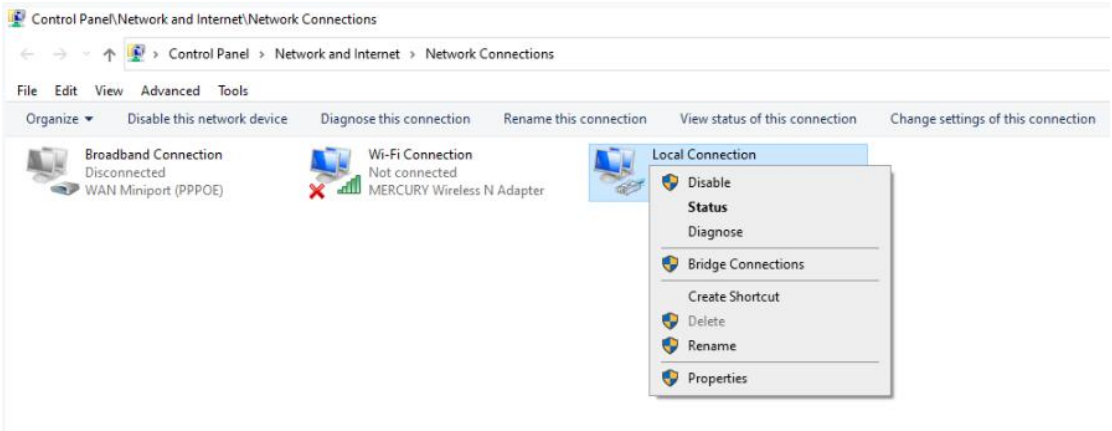

Figure 46 Network IP Address Setting

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

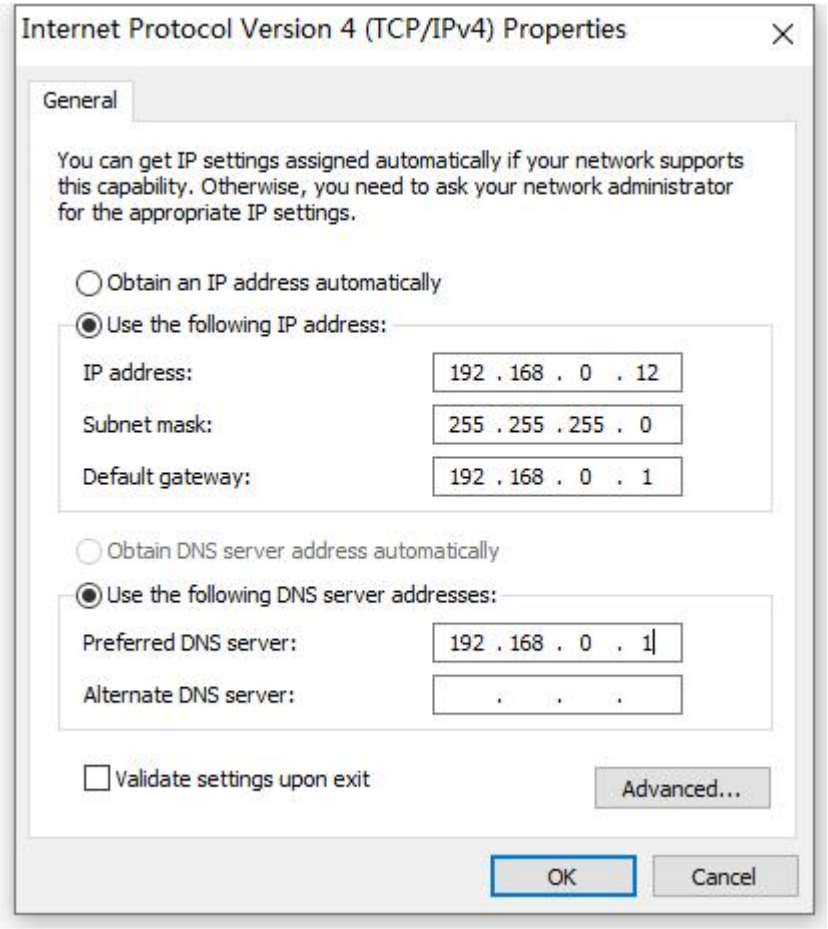

Figure 47 Network IP Address Setting

Click **Start**→Input **cmd**.

Input ping 192.168.0.123(default IP of N8361F) and check if N8361F can communicate properly.

Figure 48 Run Command

If communicating properly, the below information will be reverted.

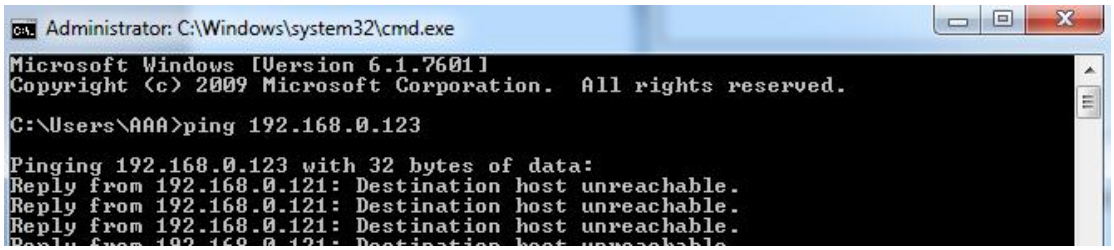

Figure 49 Communication Test

6.4 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 50 Shortcut

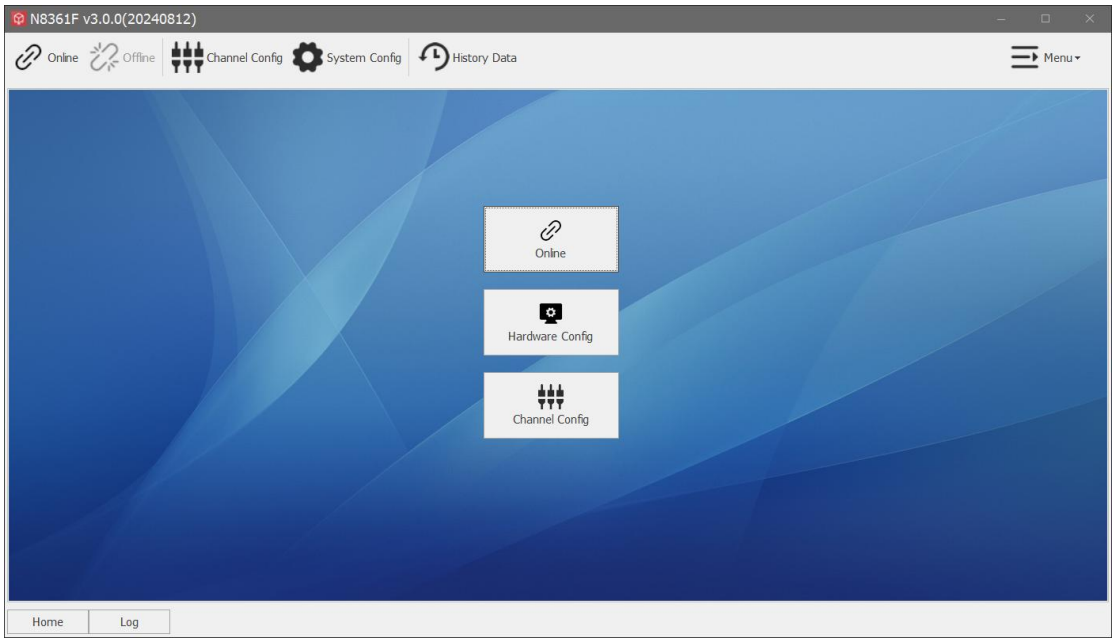

Figure 51 Application Software Interface

Application software interface introduction:

1. Toolbar

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

2. Menu
3. Home
4. Log

To display device exception information.

6.5 Configuration

6.5.1 Hardware Configuration

Operation Steps:

1. Click **Hardware Config(LAN)**.

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

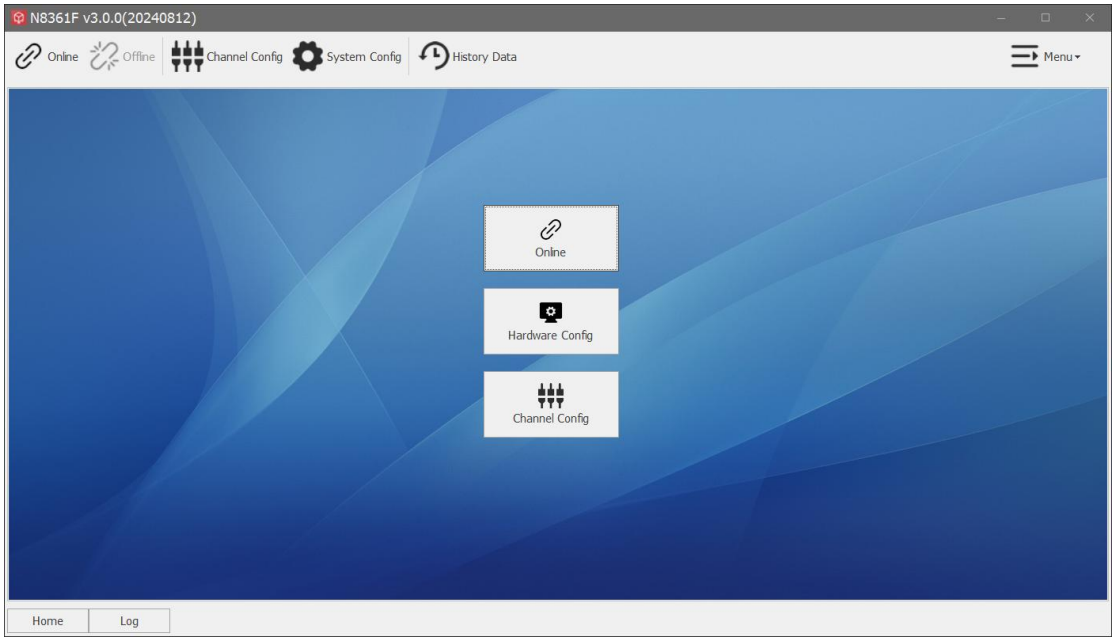

Figure 52 Hardware configuration

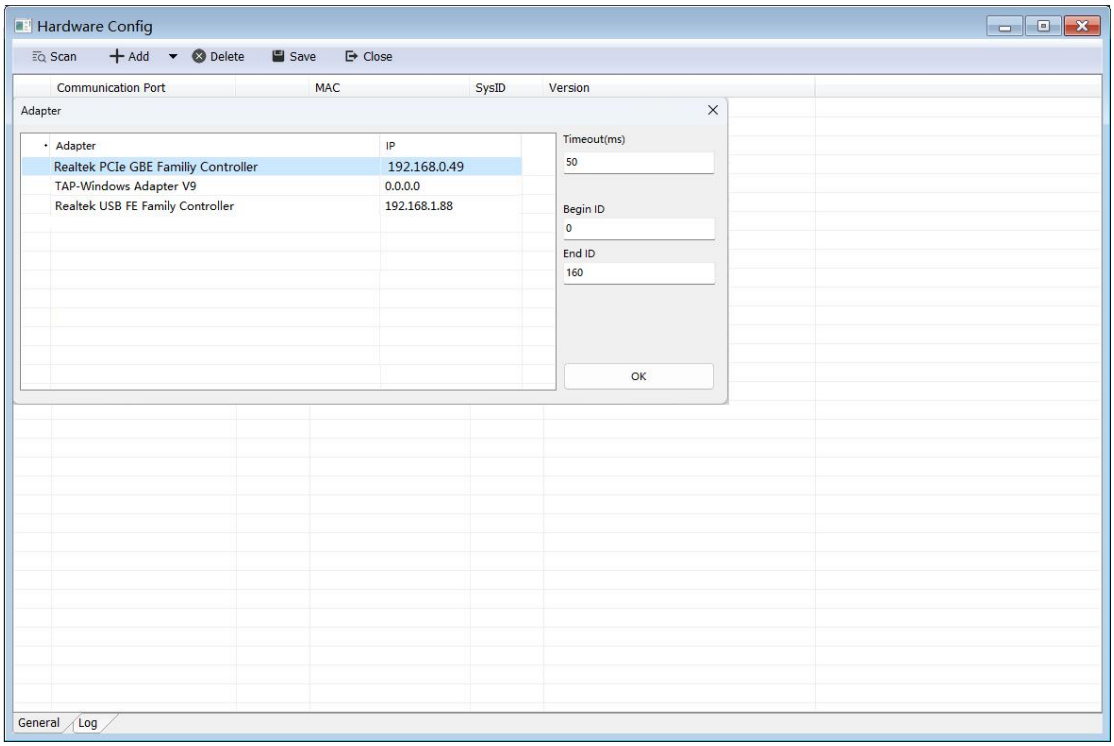

Figure 53 Scan

6.5.2 Advanced Configuration

Operation Steps:

1. Click **Menu** and select **Advanced Config**
2. Communication Interval: Set time interval for updating voltage and current data (default 1000ms).
3. Communication timeout: ≥3000ms.
4. Enter the set value, the software does not do range checking: Device is not supported, check box is invalid.

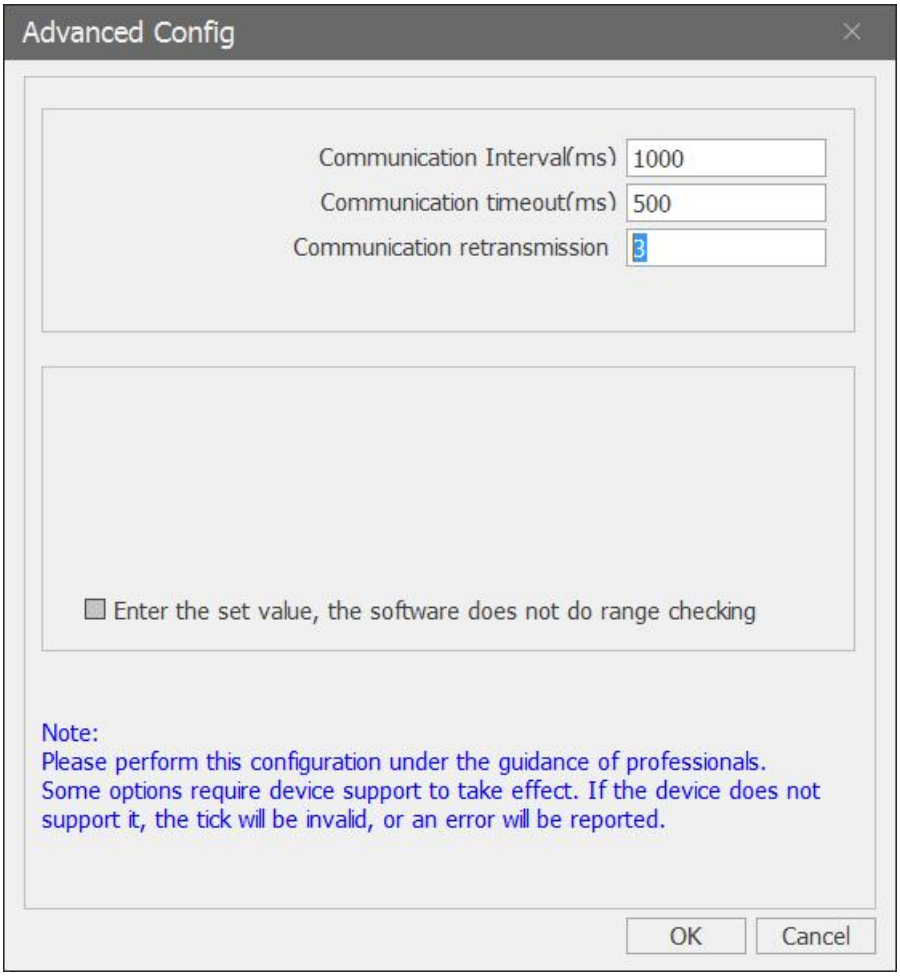

Figure 54 Channel Configuration

6.5.3 Online/Offline

Online means that the software establishes a connection with the device, and the device can be controlled only in the online state. **Offline** means that the the communication is interrupted.

Figure 55 Online

1. Toolbar: including online, offline, channel configuration, system configuration, clear error and historical data.

2. Data display area: contains data graphs and status information (voltage, current, power and time).

3. Start Data Logging: Click to start data logging, the file data (.ndat format) will be automatically saved to the historical data.

4. Function modes: including Power mode, SEQ mode, system parameters, protection configuration.

7 Maintenance and Self-inspection

7.1 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.**

7.2 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 N8361F series should be calibrated once a year.

8 Main Technical Data

Notes

Measurement accuracy is recognized when the temperature is 18℃~28℃ and the relative humidity reaches 80% within one year after calibration. Also, please warm up for half an hour before accuracy measurement.

Table 13

Mode	N8361F
Current	±10A
Voltage	-20~20V
Power	200W
	CV Mode
Range	-20~20V
Setting Resolution	0.1mV
Setting Accuracy (23±5°C)	0.01%+3mV
Readback Resolution	0.1mV
Readback Accuracy (23±5°C)	0.01%+2mV
V-Set up Time	≤10ms
Load Regulation	0.01%
Line Regulation	0.01%
Voltage Ripple (20Hz~20MHz)	1mVrms
Temperature Coefficient (0~40°C)	≤25ppm/℃
	Current Measurement
	Range 1
Range	-10~10A
Setting Resolution	0.1mA
Setting Accuracy (23±5°C)	0.05%+4mA
Temperature Coefficient (0~40°C)	≤50ppm/℃
	Range 2
Range	-1~1A

Setting Resolution	0.01mA		
Setting Accuracy (23±5°C)	0.05%+0.4mA		
Temperature Coefficient (0~40°C)	≤50ppm/℃		
	Range 3		
Range	-1~1mA		
Setting Resolution	0.1μA		
Setting Accuracy (23±5°C)	0.05%+1μA		
Temperature Coefficient (0~40°C)	≤50ppm/℃		
	Current Protection Limit		
Range	-10~10A		
Setting Resolution	0.1mA		
Setting Accuracy (23±5°C)	0.05%+5mA		
Ripple Noise (20Hz~20MHz)	<5mArms		
Temperature Coefficient (0~40°C)	≤50ppm/℃		
	DVM Function		
Channels	1CH	**Measurement Accuracy**	±0.01%F.S.
Measured Voltage Range	-30V~+30V	**Measurement Frequency**	4Hz
Measurement Resolution	0.1mV	**Input Impedance**	2MΩ
Wiring Terminal	Plugged Terminal	**Temperature Coefficient (0~40°C)**	30ppm/℃
	Dynamic characteristic		
Voltage Rise Time(10%~90%)	<50μs(no load)	**Voltage Rise Time(10%~90%)**	<50μs(Pure resistive full load)
Voltage Fall Time(90%~10%)	<50μs(no load)	**Voltage Fall Time(90%~10%)**	<50μs(Pure resistive full load)
Transient voltage drop[1]	600mV	**Transient Recovery Time[2]**	<100μs
	Others		

Communication Response Time	≤10ms
AC Input	Single phase, please refer to the voltage mark at the rear panel.
communications interface	LAN/RS232/CAN
Temperature	Operating temperature: 0℃-40℃, storage temperature: -20℃~60℃
Operating Environment	Altitude <2000m, relative humidity: 5%-90%RH(non-condensing), atmospheric pressure: 80-110kPa
Dimension	88.0mm(H)*214.0mm(W)*398.0mm(D)
Net Weight	Approx.4kg

Note 1: Under full voltage output, the load is changed abruptly from 10% to 90%, and the voltage drop value.

Note 2: Under full voltage output, the load is changed abruptly from 10% to 90%, and the voltage is restored to within (original voltage minus 50mV).