

# User Manual

## SPD1168X Programmable Linear DC Power Supply

UM0501X-E01A

2018 SIGLENT TECHNOLOGIES CO., LTD



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# General Safety Summary

Please review the following safety precautions carefully to avoid personal injury or damage to this product or any product connected to it. To prevent potential danger, please use the instrument as specified.

## **Use the proper power cord**

Only the power cord designed for the instrument and authorized by the local country should be used.

## **Power supply**

AC Input Voltages: 100/120/220/230 V  $\pm$  10%, 50/60 Hz

## **Use the proper fuse**

The fuse type: 100/120 V: T6.3A/250V

220/230 V : T3.15A/250V

Make sure to use the correct type of fuse before turning on the instrument.

Find the cause of the fuse failure before replacing the fuse and connecting the power cord.

## **Ground the instrument**

The instrument is grounded through the protective Earth conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to the Earth ground. Make sure that the instrument is properly grounded before any activating any inputs or outputs.

## **Examine all the terminal ratings**

To avoid fire or electric shock, please examine all ratings and symbols on the

instrument. Read this guide carefully to learn more details about the ratings before connection.

### **Keep proper ventilation**

Inadequate ventilation may cause an increase of temperature within the instrument, which can lead to instrument damage. Please maintain proper ventilation and check the fan and air-vents regularly when using the instrument.

### **Operating conditions**

Location: indoor, no excessive bright lighting, minimal air pollution

Relative humidity: < 80%

Altitude: < 2000 m

Temperature: 0 °C to 40 °C

### **Electrostatic Prevention**

Operate in an electrostatic discharge protected area environment to avoid damages induced by static discharges. Always ground both the internal and external conductors of the cable to remove static before connecting.

### **Do not operate in an explosive atmosphere**

To avoid personal injury or damage to the instrument, please do not operate in an explosive atmosphere.

### **Keep surface of the product clean and dry**

Avoid dust and moisture in the air as they can influence the performance of the instrument. Please keep surface of the product clean and dry.

# Safety Terms and Symbols

## Terms may appear on the product:

**DANGER:** Indicates direct injury or hazard that may occur.

**WARNING:** Indicates potential injury or hazard that may occur.

**CAUTION:** Indicates potential damage to the instrument or other property that may occur.

## Symbols may appear on the product:



**Hazardous  
power**



**Protective  
Earth Terminal**



**Warning**



**Earth  
Ground**



**Power  
switch**

# SPD1168X Brief Introduction

The Siglent SPD1168X Programmable DC Power Supply has a 2.8 inch TFT-LCD screen, programmable output, and real time graphical trending display. It has maximum output values of 16 V/8 A, and remote sensing as well as output short circuit and overload protection. The SPD1168X is suitable for a variety of applications in research and development, production, and repair.



## Main features:

- Single high-precision programmable output: 16 V/8 A, total power available is 128 W
- Compact and easy to use, ideal for bench power supply
- Stable, reliable and low noise:  $\leq 350 \mu\text{Vrms}/3 \text{ mVpp}$

- Fast Transient Response Time: < 50  $\mu$ s
- Maximum resolution of 1 mV, 1 mA with 5-digit voltage and 4-digit current display.
- Timer function sequences preset output values
- High resolution 2.8 inch TFT LCD (240\*320 pixels)
- Two output modes: two-wire output and remote sense compensation function (maximum compensation up to 1 V)
- Four input/line voltage selection choices includes 100 V, 110 V, 220 V and 230 V to satisfy different requirements
- Intelligent temperature controlled fan, effectively reduces noise
- Bright, clear graphical interface, with waveform display
- Five internal system parameters save/recall, support for data storage space expansion
- Comes with EasyPower PC software. Real-time control via USB, LAN, support SCPI command set and LabView driver package to meet the remote control and communication requirements



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# Chapter 1 Start Guide

In this chapter, we introduce the front panel and display interface of the SPD1168X, and also tips for how to check and operate the power supply the first time.

The main content of Chapter 1 includes:

- General Inspection
- The front panel
- The rear panel
- Connecting power
- User interface
- Output Inspection
- Fuse Replacement

## 1.1 General Inspection

Please check the instrument according to the following steps:

### 1. Inspect the shipping container

Keep the damaged shipping container or cushioning material until the contents of the shipment have been completely checked and the instrument has passed both electrical and mechanical tests. The consigner or carrier is responsible for damages to the instrument resulting from shipment. **SIGLENT** will not provide free maintenance or replacement for shipping damages.

### 2. Inspect the instrument

If there is damage, defects, or failures in electrical and mechanical tests of the product, please contact your nearest **SIGLENT** sales representative.

### 3. Check the accessories

Please check the accessories according to the packing list. If the accessories are incomplete or damaged, please contact your **SIGLENT** sales representative.

## 1.2 The Front Panel



### 1. LCD Display

2.8 inch TFT display. is used to display system parameter settings, system output state, menu options, prompt messages, etc.

### 2. Knob

When setting parameters, rotate the knob to increase or decrease the value of the digit at the cursor. When browsing the setting object, rotate the knob to quickly move the cursor.

### 3. Function button and power key



Setting parameter, press the Fine button to move the cursor to select the position of digit to be modified.



The right and left direction buttons move the cursor to select the parameter to be modified.



Press the button for a short period to enter the system message interface. Press the button for a longer period to activate the lock function.



Press the button for a short period to enter the timer interface. Press the button for a longer period to enter the waveform display mode.



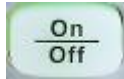
Press the button for a short period to configure the network connection information. Press the button for a longer period to

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enter the storage function system.



Press the button to enable/disable the remote sense function.



Press the button to enable/disable the channel output.

#### **4. Output Terminal**

Physical output connections to the external circuit.

#### **5. Ground Terminal**

This terminal is connected to the instrument chassis and ground wire and is at ground potential.

#### **6. Sense terminal**

Used to sense the actual voltage supplied at the load. This allows the source to compensate for any voltage drop caused by the leads between the power supply and the load and increases the accuracy of the voltage delivered to the load. Especially effective when using higher currents and/or longer leads.

#### **7. Power key**

Turns on or off the instrument.

## 1.3 The Rear Panel



### 1. Warning message

Warning message regarding proper grounding and instrument



maintenance.

## **2. AC input voltage description**

The frequency, voltage and the specified fuse should correspond to the AC input mains.

## **3. AC power socket**

The socket for AC input power.

## **4. Fuse**

The specified fuse must be rated for the input voltage (Please refer to the “AC input voltage description “)

## **5. AC line power selection switch**

AC Input Voltages: 100/120/220/230 V

## **6. LAN interface**

RJ45 jack for connection to any user-supplied LAN.

## **7. USB device**





USB-B connector for connection to a user-supplied USB controller.

## **8. Fan**

## 1.4 Connect Power

The power supply supports a variety of AC line power input values. For each line voltage, the rear panel voltage selector settings are different, as shown in table 1 below.

Table 1: AC input line power specifications

AC power input	Voltage selector configure
100 VAC $\pm$ 10%, 50 ~ 60 Hz	
120 VAC $\pm$ 10%, 50 ~ 60 Hz	
220 VAC $\pm$ 10%, 50 ~ 60 Hz	
230 VAC $\pm$ 10%, 50 ~ 60 Hz	

Please connect the external AC power carefully using the steps below:

### 1. Check the input power

Make sure that the AC line power to be connected to the instrument meets the requirements outlined in Table 1.


### 2. Check the voltage selector on the rear panel

Make sure that the voltage selector setting on the rear panel of the instrument matches the actual input voltage.

### 3. Check the fuse

When the instrument leaves the factory, the specified fuse is installed. Please check whether the fuse matches the actual input voltage according to the "Input Power Requirements" on the rear panel of the instrument.

### 4. Connect the power

Connect the instrument to AC power supply using the power cord provided in the accessories. Then press the button  to turn on the power.



#### **WARNING**

Before switching the input power supply voltage, please disconnect the power supply before setting the voltage selector To the appropriate gear.

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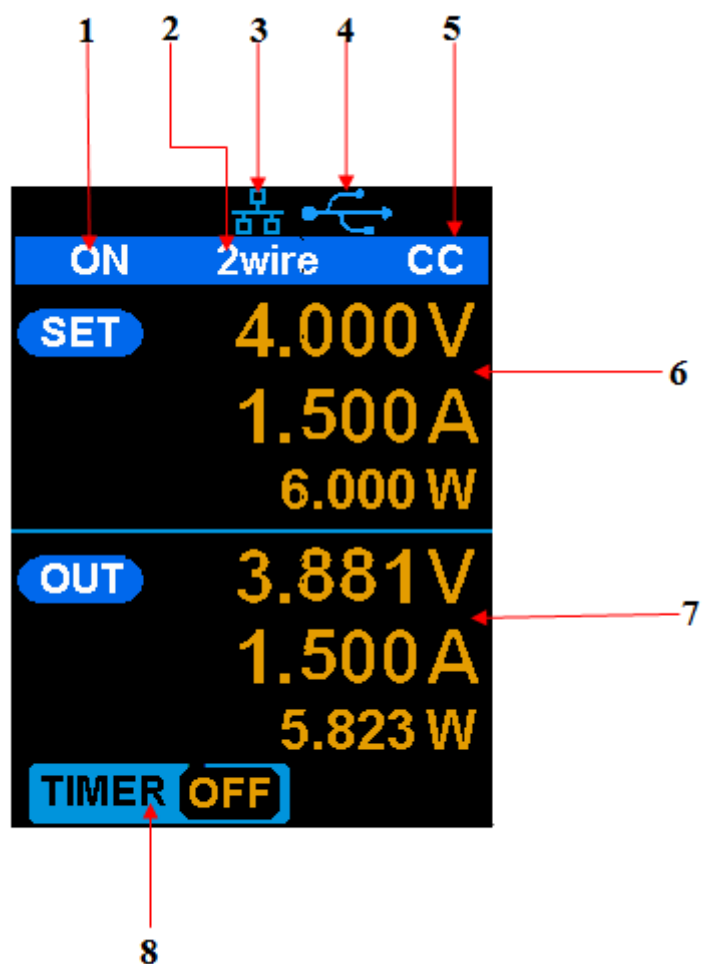


#### **WARNING**

To avoid electric shock, make sure that the instrument is correctly grounded.

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## 1.5 User Interface



1. Channel output state
2. Remote sense mode
3. LAN connection icon
4. USB connection icon
5. Output mode

**6. Output programmed values**

**7. Measured output values**

**8. Timer state**

## 1.6 Output Inspection

### 1. Check the output voltage

- (1) Turn on the power and make certain the channel current setting is not zero when the instrument has no-load.
- (2) Press **on/off** button, the supply should be working in constant voltage (CV) mode. You can check the voltage range by adjusting the voltage setpoint from the minimum (0 V) to the maximum value (16 V).

### 2. Check the output current

- (1) Turn on the power and make certain the voltage setting is not zero.
- (2) Connect the output terminals (short) with an insulated wire that can handle 10 A or more (18 AWG single core, for example).
- (3) Activate the output by pressing the **on/off** button. The low impedance (shorted) output will cause the instrument to enter current control (CC) mode. You can check the current range by adjusting the current set point from the minimum (0 A) to the maximum value (8 A).

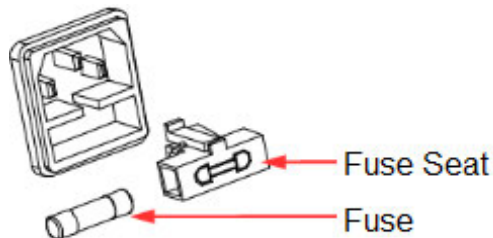
## 1.7 Fuse Replacement

The specifications of the fuse are relative to the actual input line voltage, shown in the table below. You also can refer to the rear panel “input power requirement”.

Input voltage	Fuse specification
100/120 VAC	T6.3A
220/230 VAC	T3.15A

To replace the fuse, please follow the steps below:

1. Turn off the instrument and remove the power cord.
2. Insert a small straight screwdriver into the slot at the power socket and gently pry out the fuse seat.



3. Adjust the power voltage selector manually to select the correct voltage scale.
4. Remove the fuse and replace it with the specified fuse (for the corresponding relationship between the input voltage and fuse specification, refer to the “input power requirement” at the rear panel).
5. Re-insert the fuse holder into the power socket (please pay attention to the direction).



**WARNING**

To avoid personal injuries, unplug the power supply before replacing the fuse. To avoid electric shock or fire, select the proper power supply specification and replace only with the proper fuse.

---



## Chapter 2 Control panel operation

In this chapter, the function and operation of the SPD1168X control panel will be introduced in detail.

### **Brief introduction:**

- Output summary
- Used to output the voltage and current of the channel
- Remote terminal
- LAN configuration
- Save/recall
- Timer
- Waveform display
- Version information
- Lock
- Update

## 2.1 Output summary

- ✓ The SPD1168X provides a floating output, the output rating is 0-16 V / 0-8 A;
- ✓ Two modes of output: constant voltage (CV) and constant current (CC);
- ✓ Two types of operation: tow wire mode and remote sense mode.

### Constant voltage output/constant current output:

In the constant current mode, the output current is a set value which can be controlled by the front panel. The user interface displays the output mode is 'CC' and the current is still in a set value. At this time, the voltage is lower than the set value. When the output current is less than the set value, the constant current mode would switch to constant voltage mode automatically.

In the constant voltage mode, the output current is less than the set value, which can be controlled by the front panel. The user interface displays the output mode is 'CV' and the voltage remains at the set value. When output current reaches the set value, the system switches to the constant current mode.

### 2-wire mode/remote sense mode:

When the SPD1168X is set to the 2-wire mode, the display prompt displays the working mode as "2-wire." When the output is on, the instrument will detect and display the output terminal's actual output mode automatically.

In the remote sense mode, the prompts displays the working mode as "remote sense." When the output is on and the remote sense terminal connect to the load, instrument will detect and display the actual output.

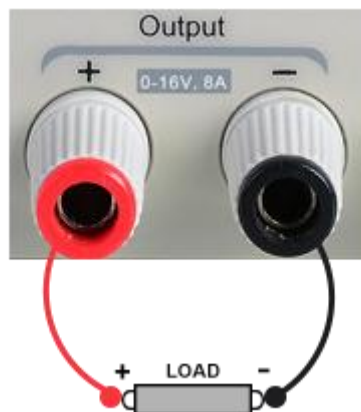
## 2.2 2-wire mode

The operation of configuration power output will introduce at the following.

### Operation method:

- 1) Connect the output terminal

As shown in the figure , connect the load with output terminal.



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### CAUTION

To avoid damages to the instrument, please pay attention to the positive and negative electrodes when connecting.

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- 2) Configure the output of voltage and current

- a) Selecting the parameters to change by moving the direction of cursor
- b) Press **Fine** button to select the data's position, then rotate the knob to change the parameter.

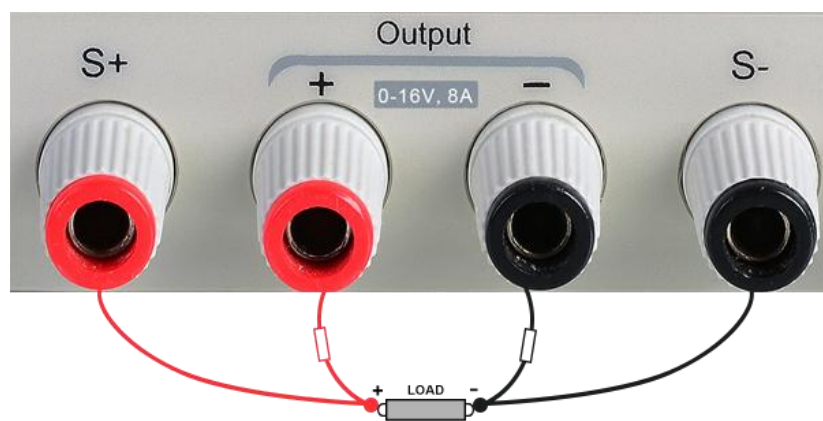
### 3) Open the output

Make sure the mode is 2-wire(the **Vsense** key is off and the interface shows 2-wire). Press the **On/Off** button, the button light is lit, the channel output is open, the interface display output status is "On".

**Note:** Built-in overvoltage protection, when the actual output voltage is greater than  $22 \pm 2$  V, the output will automatically short circuit, and limit the voltage output. In this case, you need to re-open the channel switch to resume normal output.

## 2.3 Remote mode

When the power supply is outputting large current, the voltage on the load lead will become negligible. To ensure an accurate load, the SPD1168X provides a 4-wire (remote sense) mode of operation. In this mode, the voltage at the load terminal is detected instead of the voltage at the power supply output. This allows the instrument to automatically compensate for the voltage caused by the load leads, ensuring that the user-specified power output matches the voltage obtained by the load. Front panel Sense connection as shown below.



### Operation method:

#### 1、 Connect the output terminal and sense terminal

As shown above, connect the front panel output terminal and Sense terminal to both ends of the load. When connecting, pay attention to polarity.

#### 2、 Configure the voltage and current of output

- a) Selecting the parameters to change by moving the direction of cursor
- b) Press **Fine** button to select the data's position, then rotate the knob to change the parameter.

**3、 Open the 4-wire mode**

Press **Vense** button, the button light is lit. The work mode shows '4 wire' in the interface.

**4、 Open the output**

Press the **on/off** button, the button light is lit and the interface shows "on".

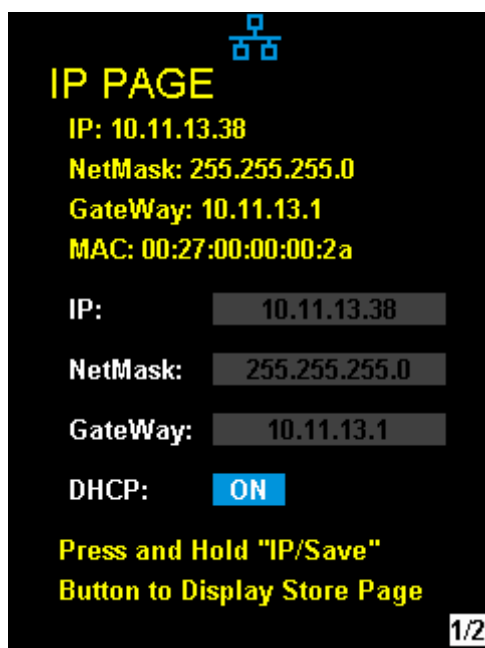
**Note:** In 4-wire mode, the maximum compensation voltage of the power supply is 1 V. When the voltage difference between the output terminal and the Sense terminal is more than 1 V, the instrument will turn off automatically.

## 2.4 Configuration of LAN interface

SPD1168X supports USB Device and LAN interface. You can remotely control SPD1168X by these interfaces. When using the LAN interface, first set the interface parameters.

Operation methods:

1. Use the network cable to connect the LAN port on the rear panel with the network of computer or where the computer is located;
2. Press **IP/Save** for a short time to enter the network setting interface.
3. Press the left and right arrow keys continuously to place the cursor on the DHCP line, then turn the knob to set DHCP to ON or OFF, then press the multi-function knob to make the setting effective.
  - **ON:** The power will automatically set the IP address, subnet mask and gateway automatically loaded according to the current access network.
  - **OFF:** user can set the IP address, subnet mask and gateway.
    - Press the left/right arrow to change the position of cursor.
    - Rotate the knob to change the data.
    - Press **Fine** key to change digits.
    - Press the knob to save the setting (all settings will take effect only if the knob is pressed)
4. Press **IP/Save** again to exit the network setting interface and return to the main interface.





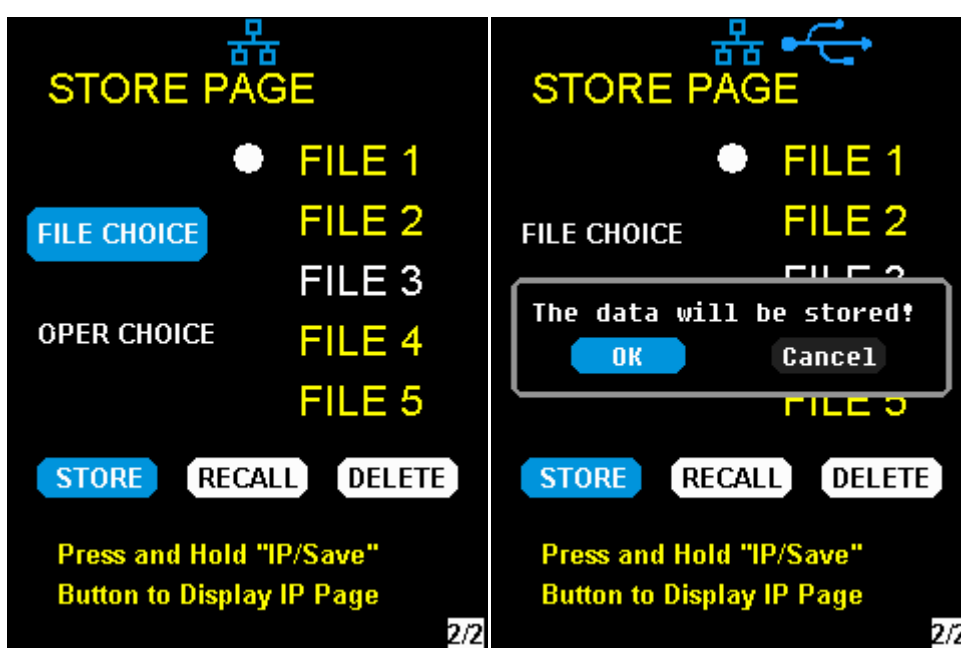
## 2.5 Save and recall

The SPD1168X allows the user to save the current instrument status (including operating modes, voltage/current settings, timer parameters, etc.) to the internal memory and recall saved files when required.

### ● Save

Operation steps:

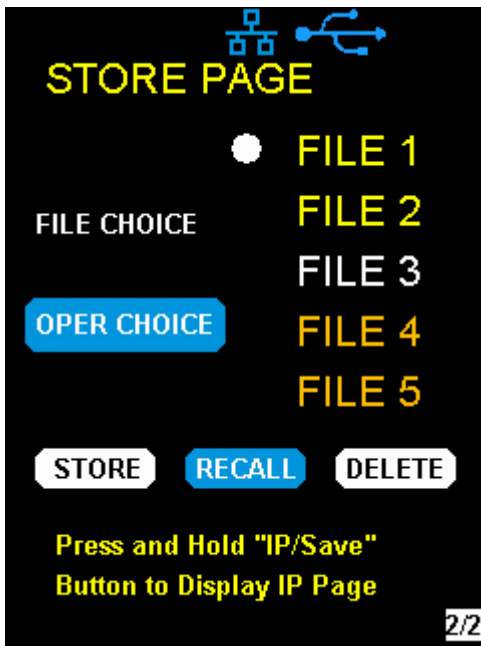
1. Set the status to be saved;
2. Press IP/Save for a long time to enter to the the configuration of saving interface.
3. Press the direction key to put the cursor to "FILE CHOICE";
4. Rotate the knob to select the saving position(FILE1~FILE5);
5. Press the arrow keys to move the cursor to "OPER CHOICE"
6. Turn the multi-function knob to select "STORE" and press the knob to select "OK" to save the current settings. After saving, the corresponding file name will turn yellow.



● **Recall**

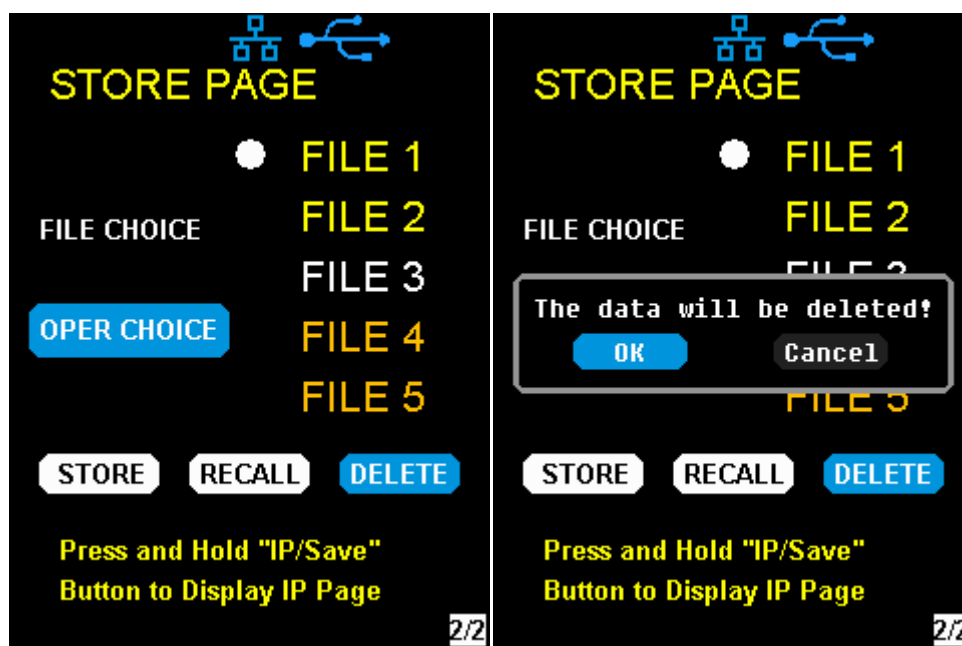
Operation steps:

1. Press **IP/Save** key for a long time to enter to the saving configuration interface.
2. Press the left and right arrow keys to move the cursor to "FILE CHOICE".
3. Turn the rotary knob to select the instrument status file (FILE1 ~ FILE5).
4. Press the arrow keys to move the cursor to "OPER CHOICE"
5. Turn the multi-function knob to select "RECALL" and press the knob to select "OK" to read the saved file.



- **Delete**

1. Press **IP/Save** for a long time to enter the saving interface;
2. Press the left and right arrow keys to move the cursor to "FILE CHOICE".
3. Turn the rotary knob to select the instrument status file (FILE1 ~ FILE5).
4. Press the arrow keys to move the cursor to "OPER CHOICE"
5. Turn the multi-function knob to select "DELETE" and press the knob to select "OK" to read the saved file.



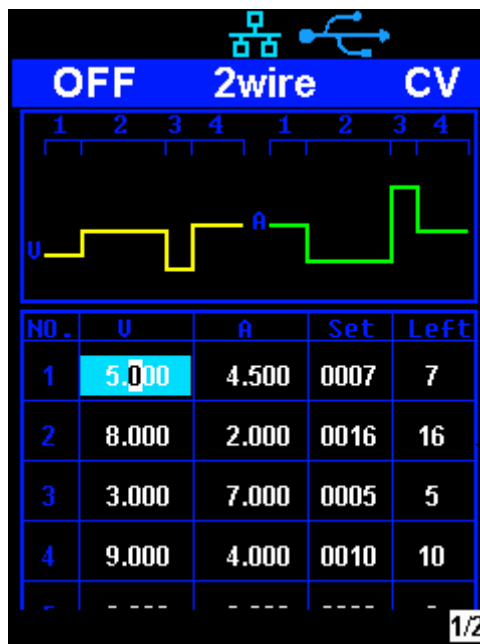
## 2.6 Timer

The SPD1168X provides a timer function. The timer can save five sets of settings, each set independent of the others. The user can set arbitrary parameters within the voltage and current values. The timer supports continuous output, and the longest time-out time is 10000 s.

- Set the timer parameter

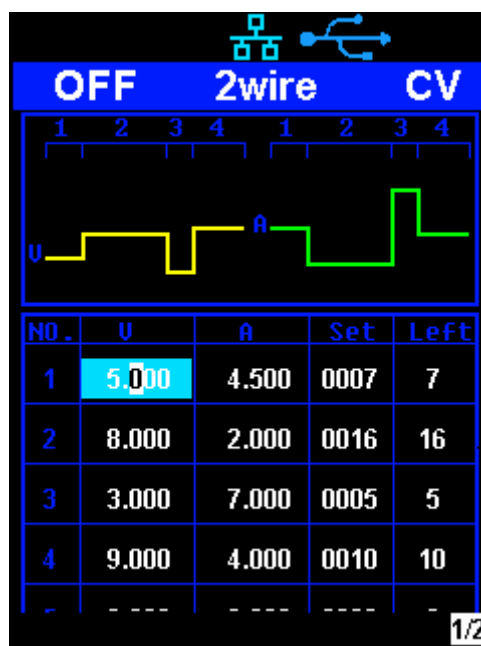
### Method 1:

1. Press **Timer/Wave** to enter the Timer Setup interface, and the indicator will illuminate.
2. Move the cursor to select the desired parameter (voltage/current/time) by pressing the corresponding direction button;
3. Rotate the multi-function knob to set the corresponding value and then press it.
4. Press **Timer/Wave** again to exit the Timer interface.



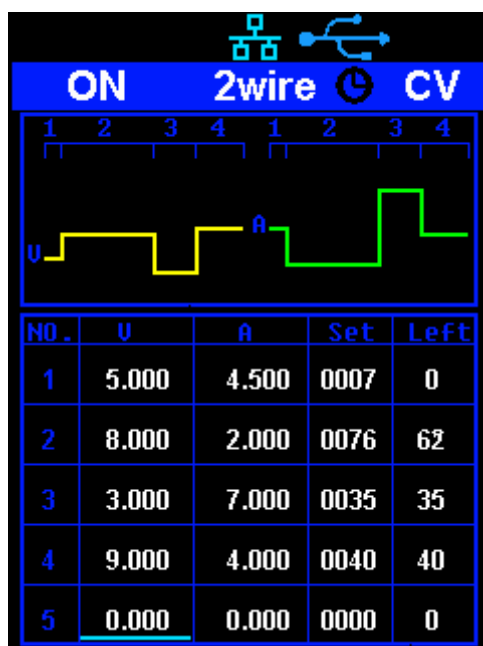
### Start the Timer

1. Move cursor to **Timer/Wave** menu by pressing the correct direction button;
2. Rotate the multi-function knob to turn the Timer state to “ON”;
3. Press the knob to start the Timer.
4. Rotate the multi-function knob to turn the Timer state to “OFF”



### Method 2:

1. Press **Timer/Wave** button to enter the Timer interface.
2. Press the knob, start the timer work group.
3. Press the knob again, turn off the timer



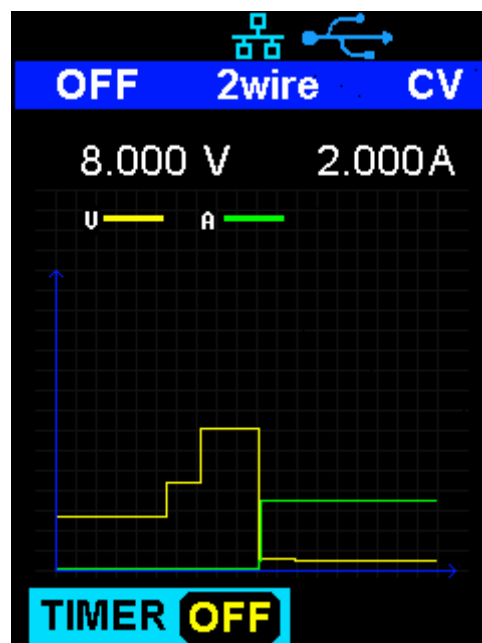
After starting the timer function, the timer will stop if you press the **On/Off** button to switch off the channel output. When the channel output is turned on again, the timer will continue counting from the last point in time it stopped. After the countdown steps have completed the timer will turn off automatically.

## 2.7 Waveform display

The SPD1168X displays the dynamic changing of the voltage and the current in the form of a trending graph..

### Operation steps:

1. Press the **Timer/Wave** key for a 3-5 seconds to open the channel waveform display function. Once activated, the key light will illuminate and the waveform display interface is activated.
2. Press the **On/Off** key to turn on the output. Now you can observe the near-real-time changes of the channel output parameters (current/voltage).



**Note:** The yellow line indicates the voltage output curve, the green line indicates the current output curve, and the ordinate axis indicates the output value.

## 2.8 Version information

Under any interface, press **Ver/Lock** to enter the version information display interface. Version information includes: the number of instrument power-up boot cycles, software version, hardware version, product model, product serial number.





## 2.9 Lock key

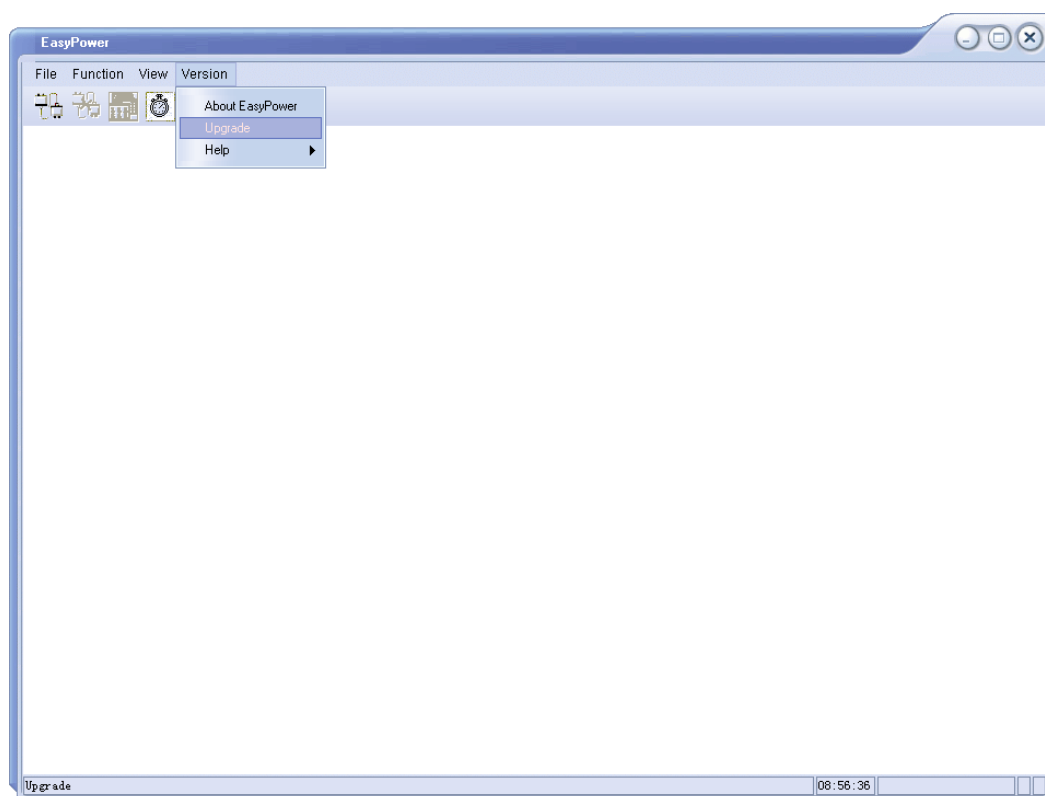
The SPD1168X allows the user to lock the front panel keys to avoid the risk of inadvertently changing a setting. Under any interface on the front panel, press the **Ver/Lock** key for 3-5 seconds to enable the key lock function. At this point, the other buttons on the front panel are disabled except for the power button. After the lock function is enabled, a "lock" icon appears at the top of the screen. Press and hold the **Ver/Lock** key again to disable the key lock function. The "Lock" icon at the top of the screen disappears.


## 2.10 Upgrade firmware

Software Upgrades are performed using Easypower, a PC-based management software program (available on the Siglent website), This is used to update the power supplies firmware via USB Device or LAN. Upgrade as follows:

### 一、 Upgrade in normal Interface

1. Open the EasyPower software after the USB interface has established its connection to the PC run the EasyPower software.
2. Click Version and then choose Upgrade in the drop-down menu to enter the USB firmware upgrade dialogue.



3. Figure shows the firmware upgrade dialogue. Click file choosing icon , and then select the file to be upgraded which must have

an ADS extension.



4. As is shown in figure 4, click **Upgrade** button to begin the upgrade. The upgrade is finished when the progress bar completes and the instrument will automatically run the version after the upgrade.



## 二、 Upgrade Via Guide Procedure

Upgrade via guide procedure also can be used if the method above does not work. Specific steps are as follows:

1. Press the knob and simultaneously turn on the instrument. It will now enter the guide procedure mode.
2. After entering the guide procedure mode, the upgrade method is the same as in the previous procedure.

---

# Chapter 3 Remote control

## 3.1 Control method

### Based on NI-VISA

Users can remotely control the instrument by using NI-VISA from NI (National Instruments Corporation). In regards to NI-VISA, there is a full version and a live version (Run-Time Engine version). The full version includes NI device drivers and a tool called NI MAX. NI MAX is a user interface that controls the device. The real-time version is much smaller than the full version and includes only NI device drivers.

For example, you can download and install the full version of NI-VISA 5.4 at <http://www.ni.com/download/ni-visa-5.4/4230/en/>.

Next use the USB cable to connect the SPD1168X (via the rear panel's USB Device connector) to the computer or use a network cable to connect the SPD1168X (through the back panel's LAN connector) to the computer's LAN.

Based on NI-VISA, the user can remotely control the SPD1168X in two ways, one through the PC software EasyPower and the other through custom programming with SCPI commands. For more information, see Programming Examples.

### Using Socket

Users can also use Socket through the network port and SPD1168X for TCP/IP protocol-based communications. Socket communication is a basic communication technology in computer networks. It allows

applications to communicate through network hardware and the standard network protocol built into the operating system. This method requires two-way communication between the instrument and the computer network through an IP address and a fixed port number. SPD1168X Socket communication port is 5025.

Using a network cable after connecting the SPD1168X (through the rear panel LAN connector) to the local area network where the computer is located, you can customize the programming with SCPI commands to remotely control the SPD1168X. For more information, see Programming Examples.

## 3.2 Grammar conventions

The SCPI command is a tree hierarchy that includes multiple subsystems, each consisting of a root key and one or more level keys. Command keywords are separated by a colon ":". The keywords are followed by optional parameter settings. Commands and parameters are separated by a space, and the parameters are separated by commas ",", add a question mark "?", after the command line to inquire about this function.

Most SCPI commands are a mixture of uppercase and lowercase letters. Capital letters indicate abbreviations of shortened commands. For better program readability, use the long commands convention. For example,

```
[CH1:]VOLTage <voltage>
```

VOLT or VOLTage, uppercase and lowercase letters in any combination will work. Therefore, Voltage, volt and Volt are acceptable.

Other formats such as VOL and VOLTAG will generate errors.

- Brackets ({} ) contain parameter choices. Brackets are not sent with the

command string.

- Vertical line (|) separates parameter selections.
- Angle brackets (<>) indicates that you must specify a value for the parameter inside the brackets. For example, for the <voltage> parameter in angle brackets for the above command, you must specify a value for this parameter (for example, "CH1: VOLT 10"). Angle brackets do not send angle brackets along with the command string.
- Optional parameters are enclosed in square brackets ([]). If you do not specify a value for the optional parameter, the instrument uses the default value. For example, [CH1:] in the above command can be omitted (for example, "VOLT 10"). At this time, the command will operate on the current channel. Brackets are not sent with the command string.

### 3.3 Command Summary

- 1、 \*IDN?
- 2、 \*SAV
- 3、 \*RCL
- 4、 INSTrument {CH1|CH2}
- 5、 INSTrument ?
- 6、 MEASure:CURRent?
- 7、 MEASure:VOLTagE?
- 8、 MEASure:POWER?
- 9、 [SOURce:]CURRent <current>
- 10、 [SOURce:]CURRent ?

- 11、 [SOURce:]VOLTage <volt>
- 12、 [SOURce:] VOLTage?
- 13、 OUTPut
- 14、 OUTPut:TRACk
- 15、 OUTPut:WAVE
- 16、 TIMEr:SET
- 17、 TIMEr:SET?
- 18、 TIMEr
- 19、 SYSTem:ERRor?
- 20、 SYSTem:VERSion?
- 21、 SYSTem: STATus?



---

## 3.4 Command description

### 1、 \*IDN?

<b>Command format</b>	*IDN?
<b>Description</b>	Query the manufacturer, product type, series NO. and software version.
<b>Return Info</b>	Manufacturer, product type, series NO., software version.
<b>Example</b>	Siglent, SPD3303S, SPD00001130025, 1.01.01.02.

### 2、 \*SAV

<b>Command format</b>	*SAV <name>
<b>Description</b>	Save current state in nonvolatile memory with the specified name.
<b>Example</b>	*SAV 1

### 3、 \*RCL

<b>Command format</b>	*RCL <name>
<b>Description</b>	Recall state that had been saved from nonvolatile memory.
<b>Example</b>	*RCL 1

### 4、 INSTrument

<b>Command format</b>	INSTrument <CH1>
<b>Description</b>	Select the channel that will be operated.

<b>Example</b>	INSTrument CH1
<b>Command format</b>	INSTrument?
<b>Description</b>	Query the current operating channel
<b>Example</b>	INSTrument?
<b>Return Info</b>	CH1

## 5、 MEASure

<b>Command format</b>	MEASure: CURRent? < CH1 CH2>
<b>Description</b>	Query current value for specified channel, if there is no specified channel, query the current channel.
<b>Example</b>	MEASure: CURRent? CH1
<b>Return Info</b>	3.000

<b>Command format</b>	MEASure: VOLTage? < CH1>
<b>Description</b>	Query voltage value for specified channel, if there is no specified channel, query the current channel.
<b>Example</b>	MEASure: VOLTage? CH1
<b>Return Info</b>	30.000

<b>Command format</b>	MEASure: POWER? < CH>
<b>Description</b>	Query power value for specified channel, if there is no specified channel, query the current channel.
<b>Example</b>	MEASure: POWER? CH1
<b>Return Info</b>	90.000

## 6、 CURRent

---

**Command format** <SOURce:>CURRent <value>  
<SOURce>:={CH1}

**Description** Set current value of the selected channel

**Example** CH1:CURRent 0.5

**Command format** <SOURce>: CURRent?  
<SOURce>:={CH1}

**Description** Query the current value of the selected channel.

**Example** CH1: CURRent?

**Return Info** 0.500

## 7、 VOLTage

**Command format** <SOURce>: VOLTage <value>  
<SOURce>:={CH1}

**Description** Set voltage value of the selected channel

**Example** CH1: VOLTage 25

**Command format** <SOURce>:CURRent?  
<SOURce>:={CH1}

**Description** Query the voltage value of the selected channel.

**Example** CH1: VOLTage?

**Return Info** 25.000

## 8、 MODE

<b>Command</b>	MODE:SET {2W 4W}
<b>Description</b>	To set the work operation of 2W or 4W
<b>Example</b>	MODE:SET 4W

## 9、 OUTPUT

<b>Command format</b>	OUTPut <SOURce>, <state> <SOURce>:={CH1}; <state>:={ON OFF}
<b>Description</b>	Turn on/off the channel.
<b>Example</b>	OUTPut CH1, ON

## 10、 TIMER

<b>Command format</b>	TIMER: SET <SOURce>, <secnum>, <volt>, <curr>, <time> <SOURce>:={CH1}; < secnum >;=1 to 5;
<b>Description</b>	Set timing parameters of specified channel
<b>Example</b>	TIMER: SET CH1, 2, 3, 0.5, 2

<b>Command format</b>	TIMER: SET? <SOURce>, <secnum> <SOURce>:={CH1}; < secnum >;=1 to 5;
<b>Description</b>	Query the voltage/current/time parameters of specified group of specified channel.
<b>Example</b>	TIMER: SET? CH1, 2
<b>Return Info</b>	3, 0.5, 2

---

<b>Command format</b>	TIMER <SOURce>, <state>  <SOURce>:={CH1}; < state >:={ON   OFF};
<b>Description</b>	Turn on/off Timer function of specified channel
<b>Instruction</b>	The command works effectively only when <secnum> starts from 1.
<b>Example</b>	TIMER CH1, ON

## 11、 SYSTem

<b>Command format</b>	SYSTem: ERRor?
<b>Description</b>	Query the error code and the information of the equipment.
<b>Command format</b>	SYSTem: VERSion?
<b>Description</b>	Query the software version of the equipment.
<b>Example</b>	SYSTem: VERSion?
<b>Return Info</b>	1.01.01.02
<b>Command format</b>	SYSTem: STATus?
<b>Description</b>	Query the current working state of the equipment.
<b>Instruction</b>	The return info is Hexadecimal format, but the actual state is binary, so you must change the return info into a binary format. The state correspondence relationship is as follows.
<b>Example</b>	SYSTem: STATus?
<b>Return info</b>	0x0224

Explanation: The returned information is hexadecimal, so the user needs to convert to binary format when confirming the status. See the following table:

Bit NO.	Corresponding state
0	0: CV mode      1: CC mode
4	0: Output OFF    1: Output ON
5	0: 2W mode      1: 4W mode
6	0: TIMER OFF    1: TIMER ON
8	0: digital display;    1: waveform display

## 12、 IPAddr

**Command format** IPAddr <IP address>

**Description** Used to assign a Static Internet Protocol (IP) address to the instrument

**Example** IPAddr 10.11.13.214

**Explanation** This command is invalid when the power is currently set to automatically obtain the network configuration (DHCP is ON)

**Command format** IPAddr?

**Description** Query the software the setting of IP address

**Example** SYSTem: VERSion?

**Return Info** 10.11.13.214

## 13、 MASKAddr

---

<b>Command format</b>	MASKaddr <NetMask>
<b>Description</b>	Used to assign a subnet mask to the instrument
<b>Example</b>	MASKaddr 255.255.255.0
<b>Explanation</b>	This command is invalid when the power is currently set to automatically obtain the network configuration (DHCP is ON)

<b>Command format</b>	MASKaddr?
<b>Description</b>	Query the software the setting of mask address
<b>Example</b>	SYSTem: VERSion?
<b>Return Info</b>	255.255.255.0

## 14、 GATEaddr

<b>Command format</b>	GATEaddr <GateWay>
<b>Description</b>	Used to assign a gateway to the instrument
<b>Example</b>	GATEaddr 10.11.13.1
<b>Explanation</b>	This command is invalid when the power is currently set to automatically obtain the network configuration (DHCP is ON)

<b>Command format</b>	MASKaddr?
<b>Description</b>	Query the software the setting of gateway address
<b>Return Info</b>	10.11.13.1

## 15、 DHCP

<b>Command format</b>	DHCP{ON OFF}
<b>Description</b>	Turn on or off the instrument's automatic network configuration feature.
<b>Example</b>	DHCP ON

<b>Command format</b>	DHCP?
<b>Description</b>	It is used to query whether the current automatic network configuration of the instrument is enabled
<b>Return Info</b>	ON

## 16、 \*LOCK

<b>Command format</b>	*LOCK
<b>Description</b>	Turn on the key lock to disable local or remote settings.
<b>Example</b>	*LOCK

<b>Command format</b>	*UNLOCK
<b>Description</b>	Turn off the key lock to validate the setting
<b>Example</b>	*UNLOCK

### 3.5 Programming examples

This section lists examples of programming with SCPI commands based on NI-VISA or Socket in Visual C ++, Visual Basic, MATLAB,



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Python, and more.

### **NI-VISA-based programming examples**

1. First confirm that your computer has installed the NI VISA library (NI website can be downloaded from <http://www.ni.com>). The default installation path in this article is C: \Program Files\IVI Foundation\VISA.
2. This article mainly uses the power of the USB interface and PC communications, some examples involve the use of LAN interface. Please use the USB cable to connect the USB Device port on the rear panel of the power supply to the USB port on the PC. You can also use the LAN interface to communicate with the PC.
3. After the power is correctly connected to the PC for the first time, power on the instrument. At this time, the **Hardware Update** Wizard dialog box will pop up. Follow the instructions of the wizard to install the "USB Test and Measurement Device".

At this point, programming preparation is completed. The following will detail the Visual C + +, Visual Basic and MATLAB development environment programming examples.

### **Visual C ++ programming examples**

**Environment:** Win7 32bit system, Visual Studio

**Example content:** Using NI-VISA, access control devices via USBTMC and TCP/IP, send commands to read the return value.

Follow these steps to complete the example:

- 1、 Open Visual Studio and create a new vc ++ win32 project.

Setting up the project environment to use the ni-visa library, you have two options for using ni-visa, static mode and automatic mode:

(1) static mode:

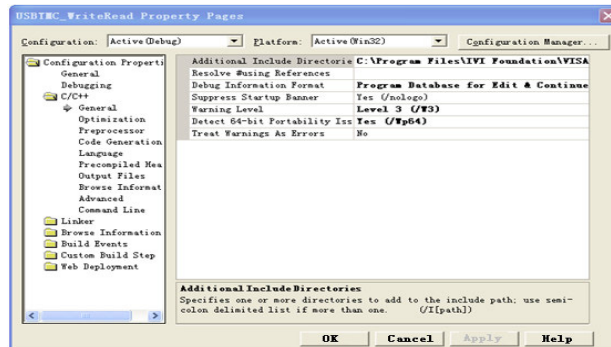
Find the files on the NI-VISA installation path: visa.h, visatype.h, visa32.lib. Copy them to your project and add them to the project. In the project .cpp file, add the following two lines

```
#include "visa.h"

#pragma comment(lib,"visa32.lib")
```

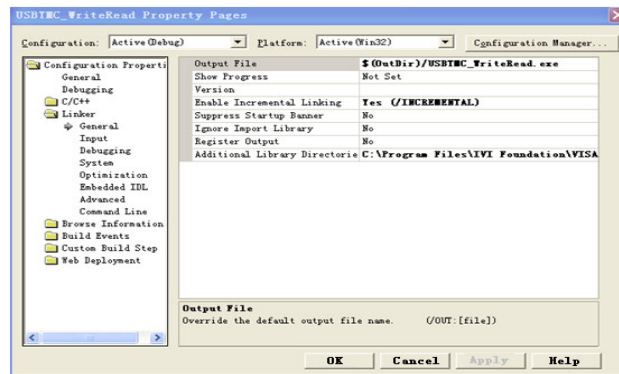
(2) automatic mode

Set .h files include directory, ni-visa installation path. In our computer, we set the path to: C: \Program Files\IVI Foundation\VISA\WINNT\include. Set this path to the project - Properties —C / C ++ — General - Additional include path, as shown:

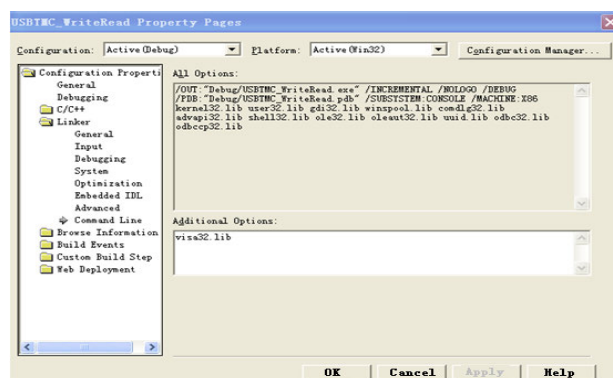


Set the library path to set the library file:

Set the library path: In your ni-visa installation path, in our computer, we set the path is: C: \Program Files\IVI Foundation\VISA\WINNT\LIB\MSC. Set this path to Project - Performance - Connector - General - additional library directory, as shown:



Set the library file: project---properties---Linker---Command Line---Additional Options:visa32.lib



Including visa.h file: in XXX.cpp file:

```
#include <visa.h>
```

2、 Add code

(1) Based on USB interface code :

Write a Usbtmc\_test function.

```
int Usbtmc_test ()
```

```
{
```

```
/* This code demonstrates using NI-VISA to send synchronous read
and write commands to a USB Test & Measurement Class (USBTMC)
instrument */
```

```
/* This example writes "* IDN? \n" string to all USBTMCs devices
connected to the system and tries to read back the result using a
read-write function */
```

```
/* The general flow of the code is to open the Explorer */
```

```
/* Open the VISA session to the instrument */
/* Use viPrintf to write the instrument flag */
/* Try to read a response with viScanf */
/* Close the VISA session */
/*****/

    ViSession defaultRM;
    ViSession instr;
    ViUInt32 numInstrs;
    ViFindList findList;
    ViStatus status;
    char instrResourceString[VI_FIND_BUFLLEN];
    unsigned char buffer[100];
    char stringinput[512];
    int i;

/* First, we have to call viOpenDefaultRM to get the manager's
handle */
/* We will store this handle in defaultRM */
}

    status=viOpenDefaultRM (&defaultRM);
    if (status < VI_SUCCESS)
    {
        printf ("Could not open a session to the VISA Resource
Manager!\n");
        return status;
    }
/** Look for all USB TMC VISA resources in our system */
/* Then the number of resources stored in the system numInstrs
Lane*/
```

```

        status = viFindRsrc (defaultRM, "USB?*INSTR", &findList,
        &numInstrs, instrResourceString);
        if (status < VI_SUCCESS)
        {
        printf ("An error occurred while finding resources.\nHit enter to
        continue.");
        fflush(stdin);
        getchar();
        viClose (defaultRM);
        return status;
        }

```

We will now open a VISA session for all USB TMC instruments. We have to use a handle from `viOpenDefaultRM`, and we have to use a string to indicate the instrument to open, which is called instrument descriptor. The format of the string can be found in the right-click parameter description in the function panel. After opening a session to the device, we get a handle to the instrument used later when using the VISA feature. The `AccessMode` and `timeout` parameters in this function are reserved for future functions. These two parameters are given the value `VI_NULL`. \*/

```

for (i=0; i<int(numInstrs); i++)
    {
    if (i > 0)
        viFindNext (findList, instrResourceString);
    status = viOpen (defaultRM, instrResourceString, VI_NULL, VI_NULL, &instr);
    if (status < VI_SUCCESS)
    {
        printf ("Cannot open a session to the device %d.\n", i+1);
        continue;
    }
    /** At this point, we now have a session open to the USB TMC instrument. Now, we
    will use the viPrintf function to send the string "*" IDN? \ N" to the device, asking the
    device to recognize */

```

```

        char * cmmand = "*"IDN?\n";
        status = viPrintf (instr, cmmand);
        if (status < VI_SUCCESS)
        {

```

```

        printf ("Error writing to the device %d.\n", i+1);
        status = viClose (instr);
        continue;
    }
    /** Now we will try to read back the response of a device information query from the
    device. We will use the viScanf function to get the data. After the data is read out, the
    response is displayed */
    status = viScanf(instr, "%t", buffer);
    if (status < VI_SUCCESS)
        printf ("Error reading a response from the device %d.\n", i+1);
    else
        printf ("\nDevice %d:%*s\n", i+1,retCount, buffer);
    status = viClose (instr);
}
/** We will now close the session using the viClose instrument. This action frees up
all system resources */
Return 0
}

```

(2) Based on the LAN port code

Write a TCP\_IP\_Test function.

```

int TCP_IP_Test (char * pIP)
{
    char outputBuffer[VI_FIND_BUFLLEN];
    ViSession defaultRM, instr;
    ViStatus status;
    ViUInt32 count;
    ViUInt16 portNo;
    status = viOpenDefaultRM (&defaultRM);
    if (status < VI_SUCCESS)
    {
        printf("Could not open a session to the VISA Resource Manager!\n");
    }

    char head[256] ="TCPIP0:.";
    char tail[] = "::INSTR";
    char resource [256];
    strcat(head,pIP);
    strcat(head,tail);
    status = viOpen (defaultRM, head, VI_LOAD_CONFIG, VI_NULL, &instr);
    if (status < VI_SUCCESS)
    {
        printf ("An error occurred opening the session\n");
        viClose(defaultRM);
    }
}

```

---

```
}
status = viPrintf(instr, "*idn?\n");
status = viScanf(instr, "%t", outputBuffer);
if (status < VI_SUCCESS)
{
    printf("viRead failed with error code: %x \n",status);
    viClose(defaultRM);
}else
    printf ("\ndata read from device: %*s\n", 0,outputBuffer);
status = viClose (instr);
status = viClose (defaultRM);
return 0;
}
```

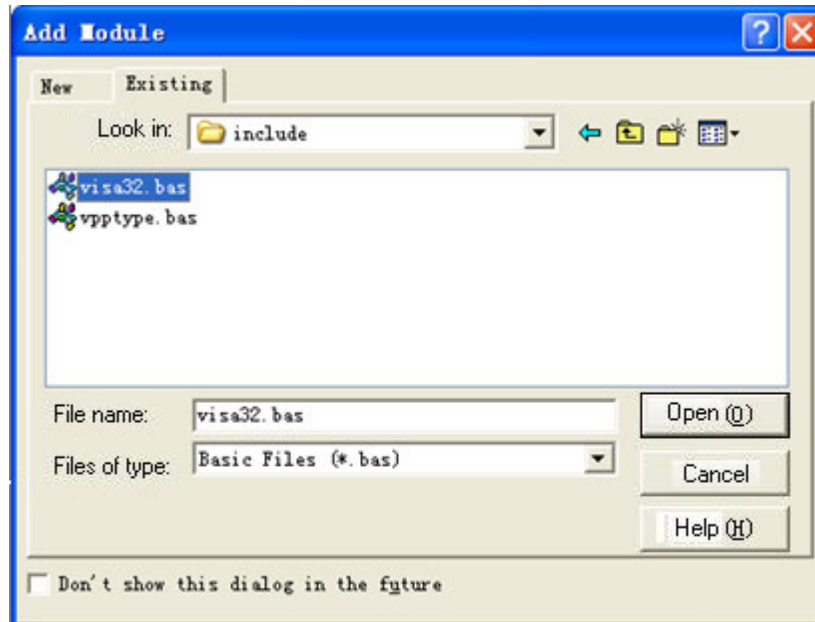
## Visual Basic programming examples

**Environment:** Windows 7 32-bit system , Microsoft Visual Basic 6.0

**Example Content:** Using NI-VISA, access control devices via USBTMC and TCP/IP, send commands to read the return value.

Follow the steps to complete the example:

- 1 Open Visual Basic, create a standard application project (Standard EXE).
- 2 Using the NI-VISA library to set up the project environment, click on the project's existing tab >> add module. Search for the include folder file under the NI-VISA installation path in visa32.bas and add the file.



This allows VISA functions and VISA data types to be used in the program

### 3、 Add code

- (1) Based on USB interface code:

Write Usbtmc\_test function.

```
function USBTMC_test()
```

This code demonstrates using NI-VISA to send synchronous read and write commands to a USB Test & Measurement Class



---

(USBTMC) instrument.

Create a VISA-USB object to connect to the USB instrument

```
vu = visa('ni', 'USB0 :: 0xF4EC :: 0x1300 :: 0123456789 :: INSTR');
```

```
fopen(vu);
```

```
fprintf(vu, '*IDN?');
```

```
outputbuffer = fscanf(vu);
```

```
disp(outputbuffer);
```

```
fclose(vu);
```

```
delete(vu);
```

```
clear vu;
```

```
end
```

(2) Based on the LAN port code:

Write to the TCP\_IP\_Test function.

```
function TCP_IP_test( IPstr )
```

```
% This code demonstrates using NI-VISA to send synchronous  
read and write commands to a TCP / IP instrument.
```

```
% Create a VISA-TCPIP object to connect to an instrument with  
an IP address configured
```

```
vt = visa('ni', ['TCPIP0::', IPstr, '::INSTR']);
```

```
% Open the created VISA object
```

```
fopen(vt);
```

```
% Send the string "* IDN?" To query device information
```

```
fprintf(vt, '*IDN?');  
  
% Request data  
outputbuffer = fscanf(vt);  
disp(outputbuffer);  
  
%Close the VISA object  
fclose(vt);  
delete(vt);  
clear vt;  
  
end
```

---

## Socket-based programming examples

### Python programming examples

Because the operating system itself supports Socket communication, this communication method is relatively concise. Note that the SPD1168X uses a fixed port number of 5025 for Socket communication, and the "\n" (newline) must be added to the end of the SCPI command string.

**Environment:** Windows 7 32-bit system, Python v2.7.5

**Example content:** Access control devices via Socket, send commands to read the return value.

The following is the script content:

```
#!/usr/bin/env python
#-*- coding:utf-8 -*-
#-----
# Access the control device via Socket, send a command, read and print the return
#value.
#-----
import socket # for sockets
import sys # for exit
import time # for sleep
#-----
remote_ip = "10.11.13.32"
port = 5025
count = 0

def SocketConnect():
    try:
        s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
    except socket.error:
        print ('Failed to create socket.')
        sys.exit();
    try:
        s.connect((remote_ip , port))
    except socket.error:
        print ('failed to connect to ip ' + remote_ip)
    return s

def SocketQuery(Sock, cmd):
    try :
```

```
        Sock.sendall(cmd)
        time.sleep(1)
    except socket.error:
        print ('Send failed')
        sys.exit()
    reply = Sock.recv(4096)
    return reply

def SocketClose(Socket):
    Socket.close()
    time.sleep(.300)

def main():
    global remote_ip
    global port
    global count

    s = SocketConnect()
    for i in range(10):
        qStr = SocketQuery(s, b'*IDN?\n')
        print (str(count) + ":: " + str(qStr))
        count = count + 1
    SocketClose(s)
    input('Press "Enter" to exit')

if __name__ == '__main__':
    proc = main()
```

---

## Chapter 4 Common troubleshooting

The most commonly encountered failures and their solutions are listed below. Please use these steps listed if an error occurs. If the problem persists, please contact [SIGLENT](#) .

### 1. The instrument will not power on.

- (1) Check whether the power is correctly connected.
- (2) Check whether the power switch at the front panel is on.
- (3) Remove the power cord and check whether the voltage selector is at the proper setting, whether the specification of the fuse is correct and whether the fuse is intact. If the fuse needs to be changed, refer to “**To Replace the Fuse**”.
- (4) If the problem remains, please contact [SIGLENT](#).

### 2. The constant voltage output is abnormal.

- (1) Check whether the maximum output power of the scale currently selected fulfills the load requirement. If yes, go to the next step.
- (2) Check whether the cable connecting the load and power supply is short-circuited and is making good contact.
- (3) Check whether the load is normal.
- (4) Check whether the current setting value of this scale is proper; if it is too low, increase it accordingly
- (5) If the problem remains, please contact [SIGLENT](#).

**3. The constant current output is abnormal.**

- (1) Check whether the maximum output power of the scale currently selected fulfills the load requirement. If yes, go to the next step.
- (2) Check whether the cable connecting the load and power supply is short-circuited and is making good contact.
- (3) Check whether the load is normal.
- (4) Check whether the voltage setting value of this scale is proper; if it is too low, increase it properly.
- (5) If the problem persists, please contact **SIGLENT**.

# Chapter 5 Service and Support

## 5.1 Maintenance summary

**SIGLENT** warrants that the products that it manufactures and sells will be free from defects in materials and workmanship for a period of three years from the date of shipment from an authorized **SIGLENT** distributor. If a product or CRT proves defective within the respective period, **SIGLENT** will provide repair or replacement as described in the complete warranty statement.

To arrange for service or obtain a copy of the complete warranty statement, please contact your nearest **SIGLENT** sales and service office. Except as provided in this summary or the applicable warranty Statement, **SIGLENT** makes no warranty of any kind, express or implied, including without limitation the implied warranties of merchantability and fitness for a particular purpose. In no Event shall **SIGLENT** be liable for indirect, special or Consequential damages

## 5.2 Contact **SIGLENT**

**SIGLENT** TECHNOLOGIES CO., LTD

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