IPDU specification

V1.0

December 21, 2022

Chapter One Product introduction

1.1 Product Overview

Single-phase and three-phase IPDU intelligent meters are based on innovative SUM (sustainable, scalable and maintainable) design concept technology. As a key component of metered cabinet distribution unit (PDU), they can provide active metering function after loading into the main body of the PDU, so as to realize energy optimization and circuit protection. User-set alarm thresholds can effectively reduce risks by sending real-time local and remote alarms to warn of potential circuit overload. Metered rack-mounted PDUs provide power usage data to enable data center managers to make informed decisions about load balancing and appropriate IT sizing, significantly reducing total cost of ownership. Users can access the metered cabinet PDU over Ethernet or RS485. This series of products can be widely used in IDC, banks, securities, government, enterprises and other data center room.

1.2 function Introduction

Functional project	specification	
Electrical parameters	input voltage	176-264VAC, 1 PH, or 3P
	Input current	Max. 63A
	frequency	50/60 Hz
	Output voltage	176-264VAC
	Output digit	The value can contain a maximum of 48 characters
	Break protection (please indicate brand and quantity)	optional
Structural dimension	Mounting method (vertical or horizontal)	vertical
	Width (applicable PDU width series)	1U & 1.5U and above
	Protrude the height of the socket surface	22mm
	Shell material	Plastic PC
Working environment	Operating temperature	-10° to +50° C
	Working humidity	5-95%RH
	altitude	0 - 3 000 m
Safety regulations and certificates	Certificates and declarations	CE
User interface	Display screen	TFT color screen
	Operating key	Top button, bottom button, reset button
	Communication interface	One Ethernet, two RS485 and one USB
	Temperature and humidity interface	1 piece
	Indicator light	Operation, electrical power, communications
Electrical	PDU Total measurement	Voltage, current, power, frequency,

parameter measurement and control function		power factor, electrical energy.
	Measurement of each phase	There is no
	Each output can be remotely on/off control	There is no
	Users can customize the power-on/power-off sequence and interval for each output	There is no
	The output unit can be controlled in groups	There is no
	Administrator rights can be defined at different levels	have
	You can customize alarm thresholds	Current and voltage can be set
	Cascading function	Yes, RS485

1.3 Type selection

IPDU-010063
IPDU-XXXXXX-XXXX
X:0 vertical, 1 horizontal
X:0 DC, 1 single-phase, 2 three-phase four-wire, 3 three-phase three-wire, 4 two-phase three-wire
X:0 indicates no branch monitoring and no control; 1 indicates branch control; 2 indicates branch monitoring; 3 indicates both monitoring and control.
XXX: specification current
-XXXX: Customer requirements: the first X, indicating the number of temperature and humidity; The second X represents several switching devices; The third X: 0, without USB, 1, with USB; The fourth X,0 without 485,1 with 485;
Among them, the standard does not take the "customer requirements" part, the standard unified with a network, a USB, a temperature and humidity, two 485 ports.

Chapter two, technical parameters and installation

2.1User interface and parameters

Product structure diagram	Serial number	project	parameter	
	①	Liquid crystal display	Display mode	TFT color screen
			Display content	Instrument information
			Display direction	level
			Refresh time	300ms
	②		Running light	
	③		Energy indicator light	
	④		Communication lamp	
	⑤	Page up button	Tap down to turn the page Short press to cancel the beep	
	⑥	Menu key	Set instrument parameter values	
	⑦	Page down button	Tap down to turn the page Short press to cancel the beep	
	⑧	Temperature and humidity	Temperature and humidity sensor detection	
	⑨	Network port	IP ADD: MAC、DHCP、MASK、Gateway	
			SNMP(V1/V2c/V3)	
			HTTPS/HTTP	
			SMTP	
			Network user	
	③④	RS485port	Cascading configuration, modbus, baud rate	
	⑩⑪	RS485	RS485 cascading input and output	
	⑫	USB	Software upgrade and log export	
	○13	Reset key	Hold down for more than 10 seconds to reset device parameters	
	○14	Fault indication	From top to bottom: Network hardware failure; Cascade. Green normal, red fault.	

Liquid crystal display infographic	Display content	parameter
	Model number voltage current power Power factor Electric energy	Voltage: Resolution: 0.1V Accuracy: ±1%+1 word Response time: 400ms Current: Resolution: 0.001A Accuracy: ±1%+1 word Response time: 400ms Power: Resolution: 0.001KW Accuracy: ±1% Response time: 400ms Power factor: Resolution: 0.001 Response time: 400ms Electric energy: Resolution: 0.001KWh Accuracy: ±1% Response time: 400ms Temperature: Resolution: 0.1℃ Accuracy: ±0.5 Response time [3] : < 10s Humidity: Resolution: 0.1RH Precision [2] : ±3%
	Humidity 1 Temperature 2 Humidity 2 Temperature 3 Humidity 3	
	Temperature 4 Humidity 4	
	I01 I02 I03 I04	
	Temperature 1 alarm value Humidity 1 Alarm value Temperature 2 alarm value Humidity 2 Alarm value Temperature 3 alarm value Humidity 3 Alarm value	

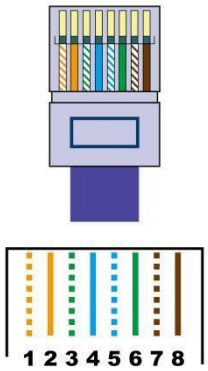
	Temperature 4 alarm value Humidity 4 Alarm value	Response time [3] : < 6s
	Port number MAC address DHCP status: ON,OFF IP address	
	Software version Hardware version Cascading: Host or slave time date Software model Running time	
	Relay setting (without this function) Network setup Device restart Language setting factory data reset	
	Network setup static DHCP(dynamic)	
	Device restart	

	Language setting Chinese English	
	factory data reset	

2.2 Terminal definition

2.2.1 RS485 Interface terminal

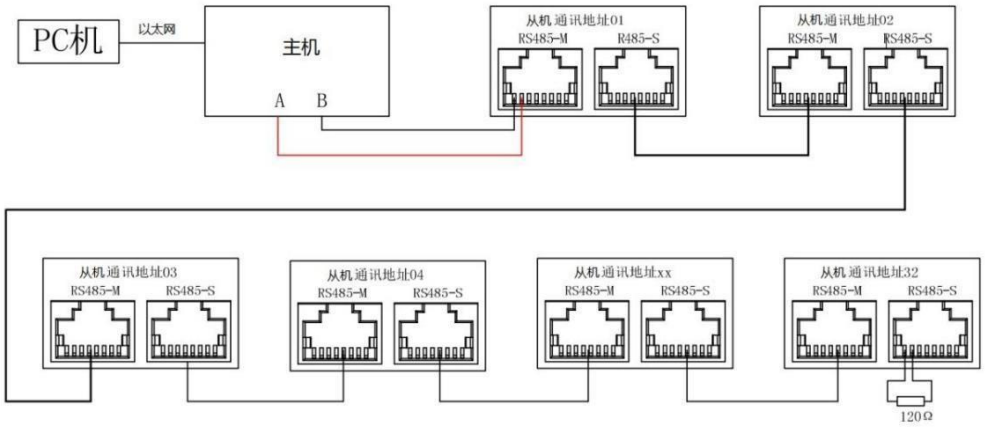
RS485 ports, Pin4(blue)485 B, Pin5(blue and white)485 A.
Note: The cable color of RJ45 may be incorrect, as shown in the figure. One end is terminal 1.



color	Function description
Orange white	NC
Orange	NC
Green white	NC
blue	RS485-B
blue white	RS485-A
Green	NC
Brown white	NC
Brown	NC

2.2.2 Cascade communication

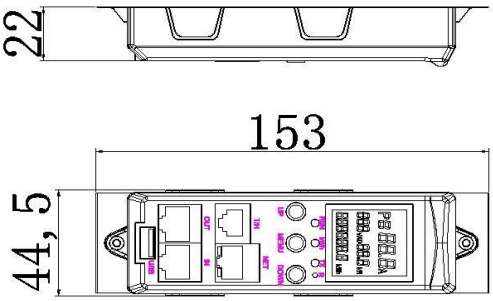
RS485-M and RS485-S are the same RS485 communication bus and provide two interfaces for easy cascading. It is recommended that RS-485 communication cascades be connected to a maximum of four meters to ensure real-time data validity. Connect to the upper computer through the host computer. Common shielded twisted pair cables can be used for communication cables. When RS485 communications cables are routed outdoors, ensure that the shielded layer of the cables is grounded and the total length of the communications cables should not exceed 1200 meters. The positive and negative polarity of the RS-485 port of each device must be connected correctly. If the shielded twisted pair cable is long, you are advised to connect it to about 120 ohms and reduce the transmission rate to improve communication reliability.



2. 3 **Install.**

2. 3. 1

Head size：153*44. 5*22mm，



2. 3. 2

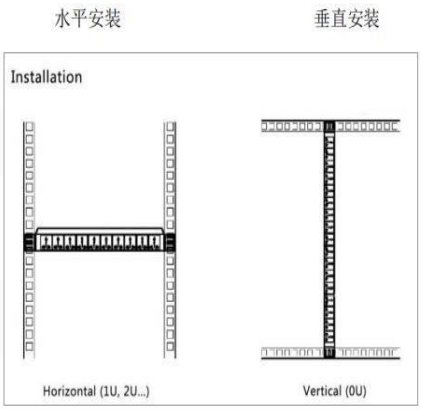
◆ Installation instructions and maintenance

1. Rack type power socket unit is installed in 19 "industrial cabinet. Install at the front end of the protected device (or system). 2, when the socket is connected to the power system, it can be The rear equipment is powered on.

3, this product is strictly prohibited to disassemble, otherwise, by All consequences arising therefrom shall be borne by oneself.

4. Please use a fixed bracket during installation.

5, please connect the wire correctly, pay attention to the safety of electricity.



Chapter 3 Network operations

3.1 Supported browsers

You can use Google ®Chrome® or Mozilla®Firefox® to access the PDU through its Web UI. Other commonly used browsers may work, but have not been fully tested

3.2 Description of cascading Settings

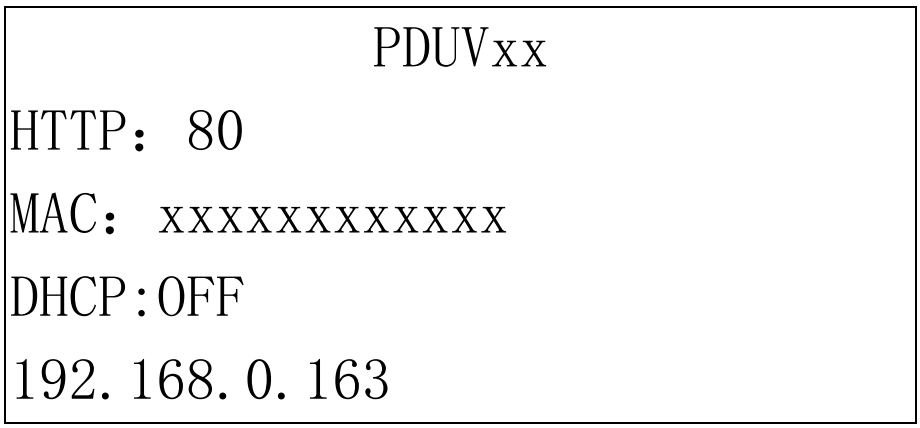
◆ you can use the PDU system IP address to the URL as a Web interface, use case-sensitive user name and password to log in

◆ PDU factory default using a static IP address, the default address for 192.168.0.163, in the display module LCD display, you can query the current IP address from the network status page. To configure dynamic IP addresses, enable the DHCP function on the device

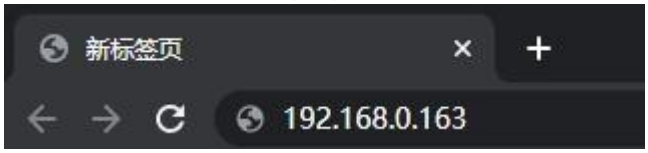
◆ before using cascade function, need to each IPDU configuration choice master-slave mode, in which the host mode only a PDU, PDU mode can be configured by default to Taiwan from the machine

3.2.1 Cascade Settings

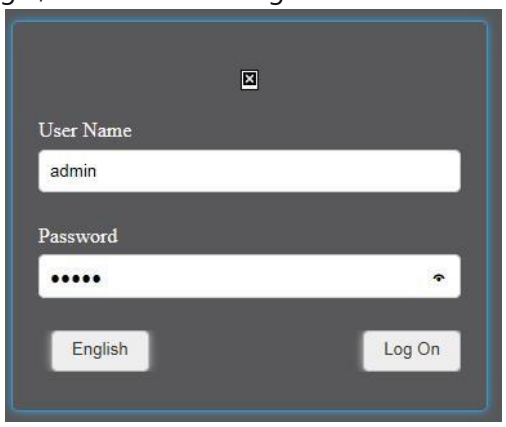
After the PDU is powered on, connect a network cable to its network port. On the LCD of the display module, you can press the key to query the IP address (192.168.0.163) from the network status page



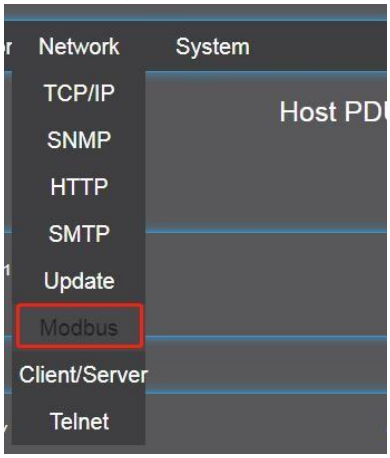
Enter the IP address of the PDU in the URL field of your Web browser (http://192.168.0.16 3), as shown in the following figure



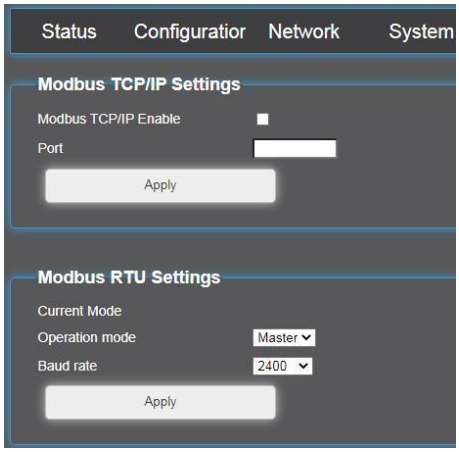
The default user name and password of the super administrator are "admin", and then click login, as shown in the figure.



In the network Settings of the Web interface, click Modbus Settings, as shown in the figure



In the cascading Settings, select the current PDU as the host/slave mode and click Set, as shown in the figure



In the upper right corner of the page, click Restart PDU to make the working mode Settings change take effect.

Check the PDU table header. In the LCD display of the display module, press the key and the status page expansion bar becomes host, indicating that the PDU host mode is set successfully. If the status page expansion bar is set to slave, then the status page expansion bar becomes slave x, as shown in the figure

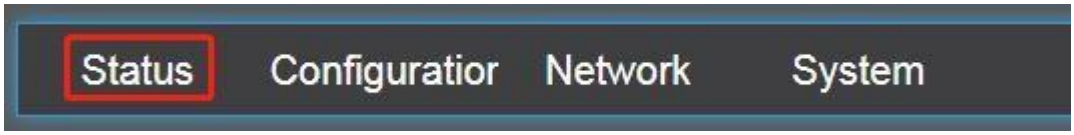
```
Software:1.0.0
Hardware:1.2-1.2
Cascading: Hosts
Time:08:05:20
Date:2022-12-23
Model number:PDUVxx
Operation: 15:00 on 18th
```

3.2.2 Connection mode of the host and slave

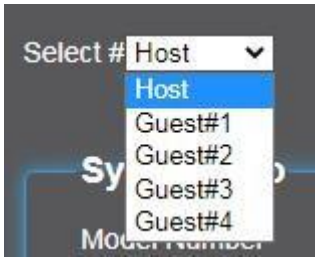
After one host PDU and four slave PDUs (a maximum of four) are configured in master/slave mode through the Web configuration, connect network cables to the network ports of the host PDUs. The network ports of the four slave PDUs (a maximum of four slave PDUs) are suspended, and connect the host and slave PDUs in series through the RS485 interface. In this way, host PDUs are cascaded to slave PDUs. Users can control host IPDU and slave PDUs by logging in to the Web interface of host PDUs.

3.3 Device status description

Device status contains device information about the host and four slave servers, power data, temperature and humidity information, and alarm status information

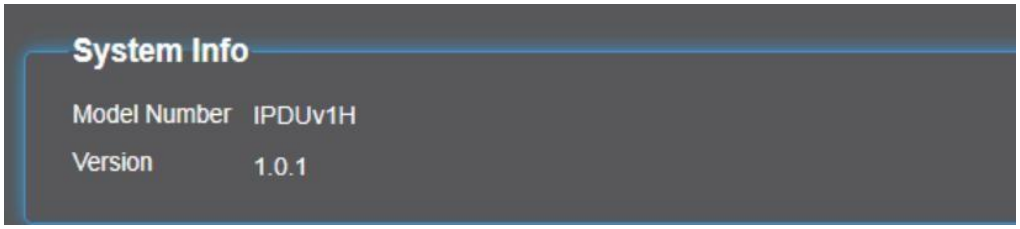


On the Web interface, click Status to display the host data by default. You can select the status data of slave 1 to slave 4 from the drop-down menu, as shown in the figure

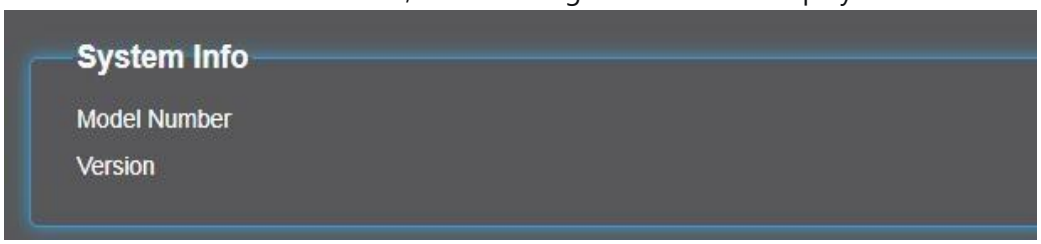


3.3.1 Device information

PDU device information, including the model and version, is shown in the figure



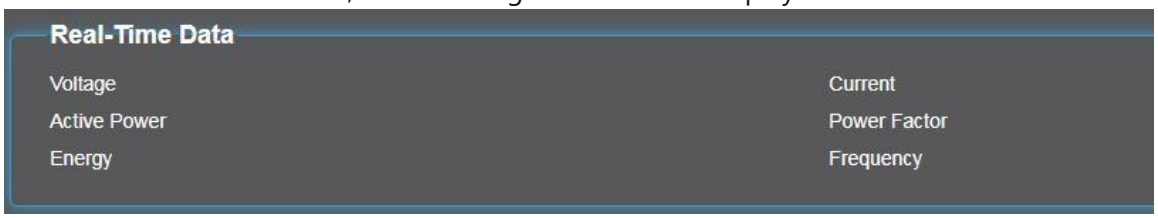
If the slave is not connected, the following information is displayed:



3. 3. 2 Electric energy state

The power state of the PDU includes voltage, current, active power, power factor and electrical energy, as shown in the figure

If the slave is not connected, the following information is displayed:



3. 3. 3 Temperature and humidity state

Temperature and humidity status of the PDU, showing the current temperature and humidity data, as shown in the
figure

If the system fails to read information from the T/H sensor, a hyphen (-) is displayed.

By default, the device has only one T/H port. However, the device supports the expansion of T/H devices through a built-in or external sensor box.

3.3.4 Alarm status

PDU alarm status: Indicates the status of the voltage, current, temperature, humidity, and I/O sensor (such as access/water/smoke sensor) relative to the corresponding threshold Alarm status:

◆ current state value is lower than warning threshold column corresponding lower limit of configuration, according to the limit

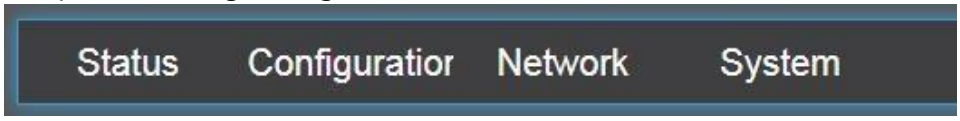
◆ current state value is higher than or equal to the alarm threshold column on the configuration of the corresponding threshold, according to the limit

◆ otherwise will show the normal state If the device is not connected, "-" is displayed.

The PDU does not reserve sensor ports for I/O nodes, but supports the use of built-in or external sensor boxes to expand sensor nodes.

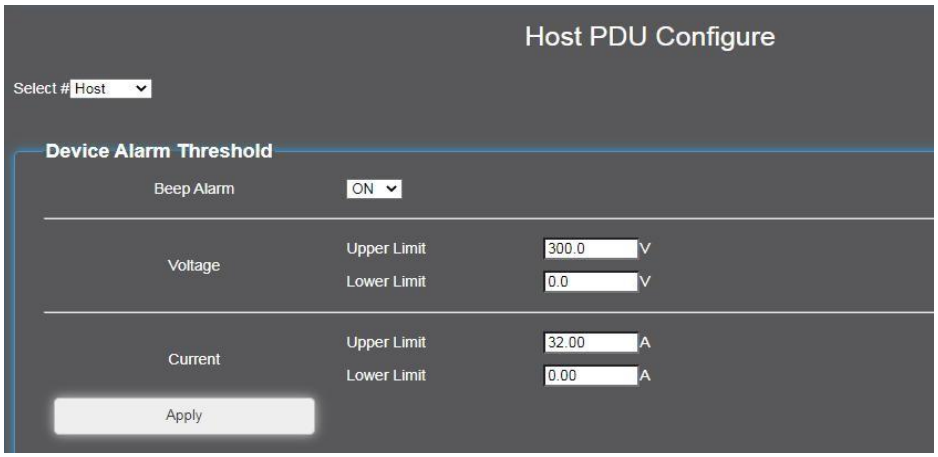
3.4 Parameter setting description

Parameter Settings include device alarm threshold Settings, sensor alarm threshold Settings, and power clearing Settings for the host and slave



3.4.1 Device alarm threshold Settings

On the Web interface, click the Settings menu, as shown in the picture



Buzzer switch specifies whether to enable the buzzer to buzz when an alarm is generated.

Voltage/current threshold: sets the upper and lower alarm thresholds of the current voltage/current.

3.4.2 Sensor alarm threshold Settings

The sensor thresholds are set as follows

You can set the upper and lower alarm thresholds for the current temperature and humidity. The current device supports only one temperature and humidity interface. However, the device supports the expansion of sensors through a built-in or external sensor box. In this case, you can set upper and lower alarm thresholds for the temperature and humidity in the sensor box.

3.4.3 Electric energy setting

In the setting of electrical energy, the electrical energy of the host/slave can be cleared, as shown in the figure

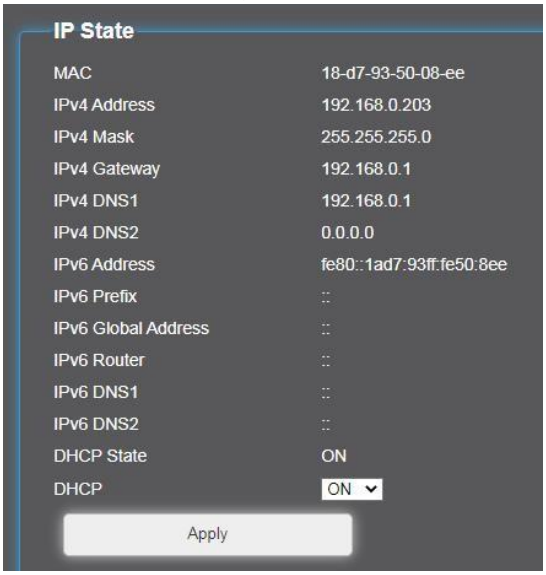
In TCP/IP Settings, DHCP is set to ON by default. The IPDU automatically obtains an IP address assigned by any DHCP server. If DHCPP is set to ON, the IP address, mask, and gateway boxes are invalid, as shown in the figure

3.5 Network setup

Network Settings include IP address Settings, SNMP Settings, web login mode Settings, email Settings, upgrade Settings, Modbus Settings, client/server Settings, and Telnet Settings.

3.5.1 TCP/IP set

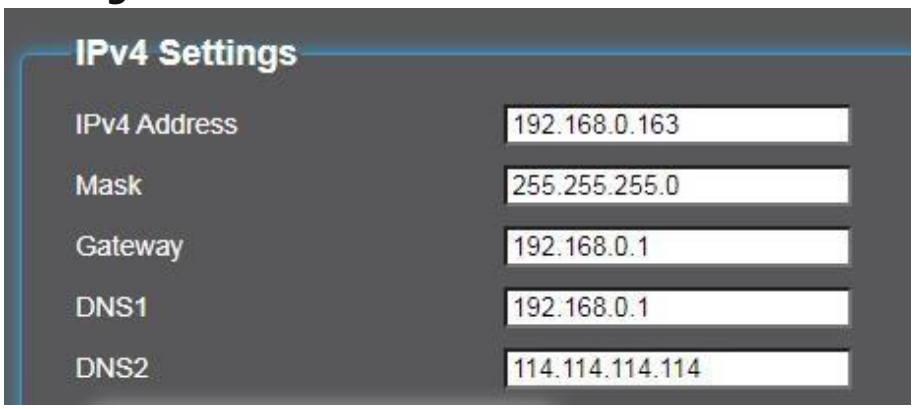
The device supports static or dynamic IP addresses:



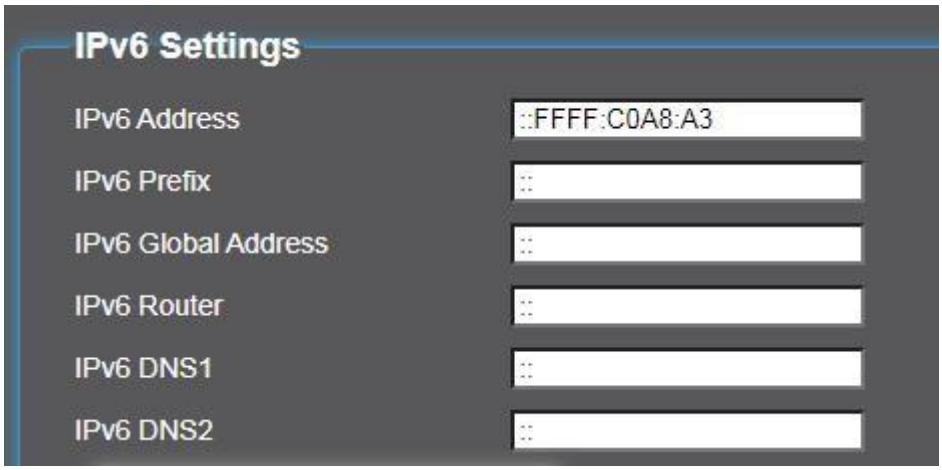
You can enable or disable DHCP to select a static IP address or a dynamic IP address.

If DHCP is set to Off, you can customize a static IP address by entering the required value in IP address, mask, gateway, and DNS server. If dynamic IP addresses need to be set, set DHCP to Enable.

Setting a static IPv4 address



IPv6 Static address setting

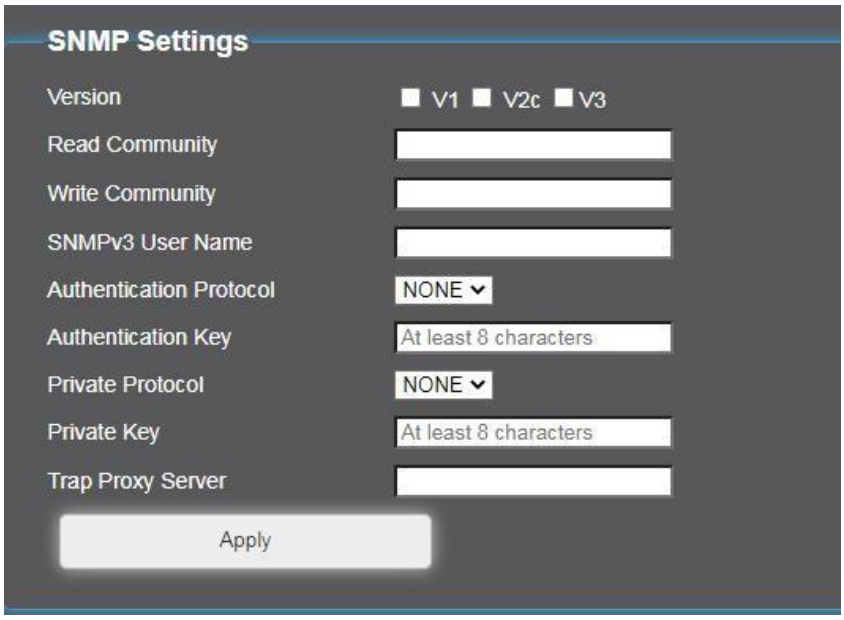


3.5.2 SNMP Settings

The PDU supports SNMPv1, SNMPv2c, and SNMPv3.

When you select SNMPv1 and SNMPv2c, you can perform operations on SNMP by setting the community name and proxy server IP address.

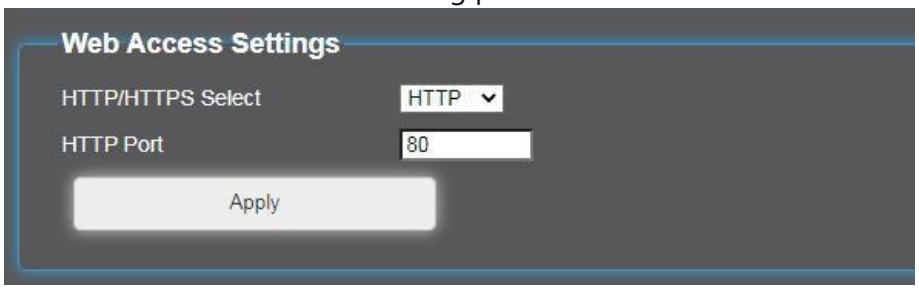
When the User selects SNMPv3, the user can set the User Name, authentication key, and private key to set or control the device through SNMP:



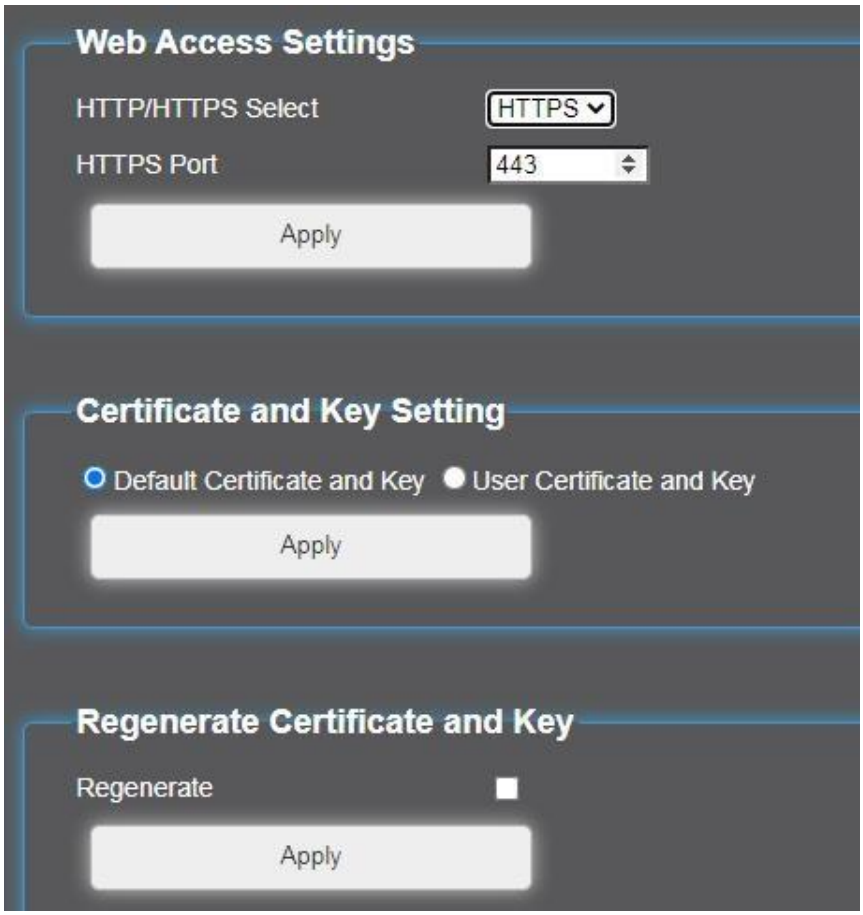
In SNMPv3, the default authentication protocol is SHA, authentication key is PDUAUTHKEY, private key protocol is AES, and private key key is PDUPRIVKEY.

3.5.3 Web page setup

The PDUs can access web data through HTTP or HTTPS. You can set the PDUs to access data through HTTP or HTTPS on the web page.
If you select the HTTP option, you can set the port to be accessed. The default port is 80. You can also customize the following parameters:



When HTTPS is selected, you can set the access port, certificate type, and certificate reset function:



The default HTTPS port is 443.

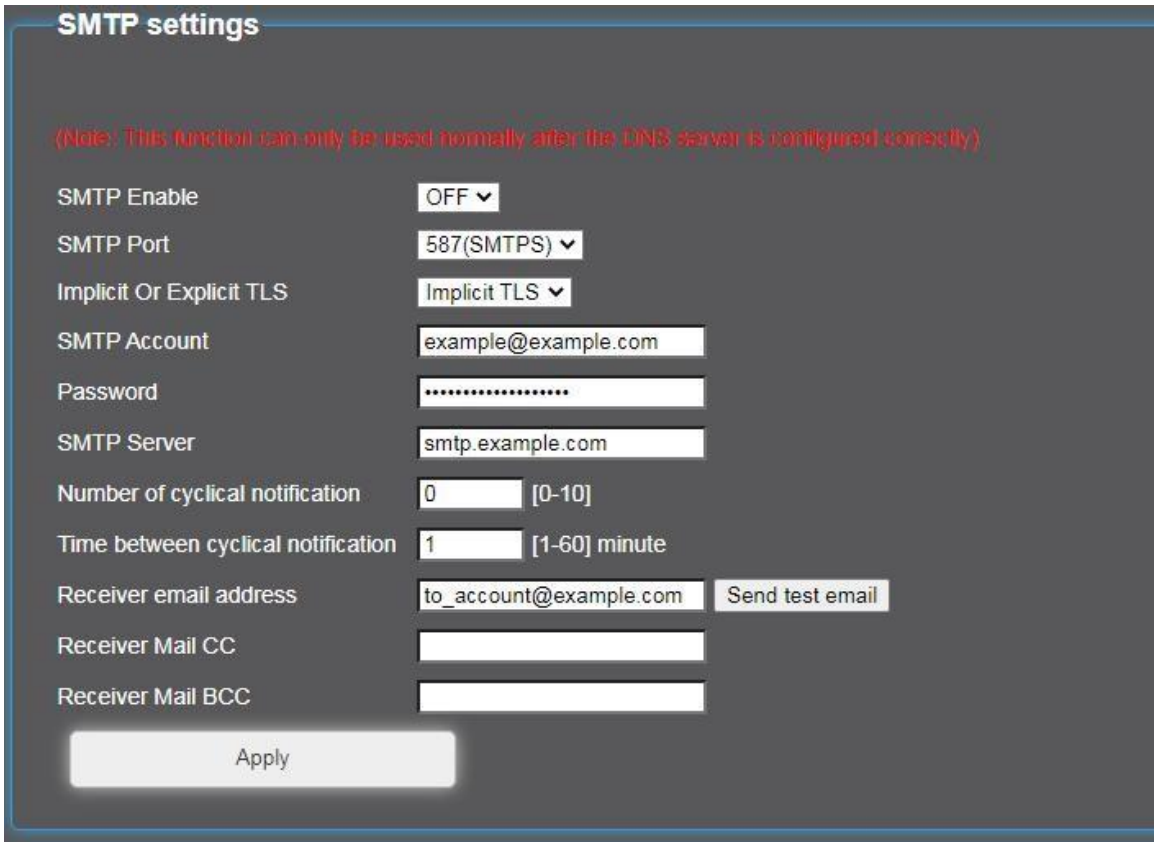
The certificate and key Settings are mainly used to determine whether the PDU uses the certificate automatically generated by the device or the certificate imported by the user to log in to the web interface. By default, the PDU uses the certificate automatically generated by the device and the validity period of the certificate is 10 years

Currently, the device supports the import of the ECC certificate or RSA2048 certificate to meet users' security requirements.

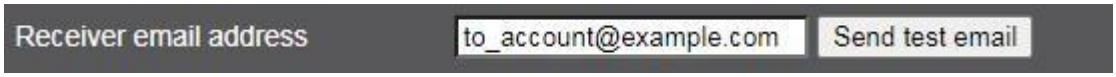
The purpose of regenerating the default certificate and key is to reset the time of the default certificate generated by the device to the current PDU time. In this case, the certificate expires or an error occurs and you cannot log in to the web interface.

3.5.4 Email setting

Mailbox Alarm emails can be sent to specified mailboxes through smtp:



After setting all the functions, the user needs to restart the device to make it take effect. Then, click the button of "Send test Email" to test whether the current configuration takes effect.



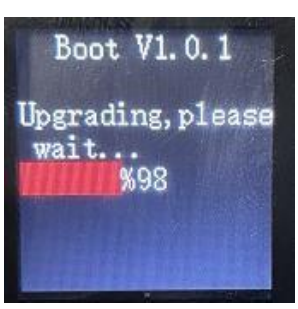
After the configuration takes effect, you can set Periodic Notification Quantity to set the number of times for sending emails when an alarm occurs, and Periodic Notification Interval to set the interval for sending emails when an alarm occurs.

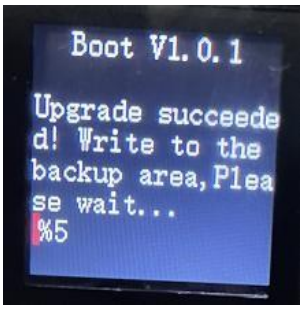
3.5.5 Upgrade Settings

In upgrade Settings, users can import customized certificates and keys and upgrade the current firmware.

The PDU supports certificate, key, and device firmware import through web, and firmware import through TFTP. To upgrade the firmware, you are advised to use TFTP. When upgrading the firmware through TFTP, you can set the IP address of the TFTP server, run the TFTP software on the local computer, and save the firmware to the corresponding folder. The TFTP task searches for the TFTP server every one minute. If the server exists, the firmware is upgraded immediately.

After the firmware upgrade is complete, the LCD will prompt you to upgrade, and the LED running light will keep blinking quickly. Please wait patiently until the upgrade is complete:





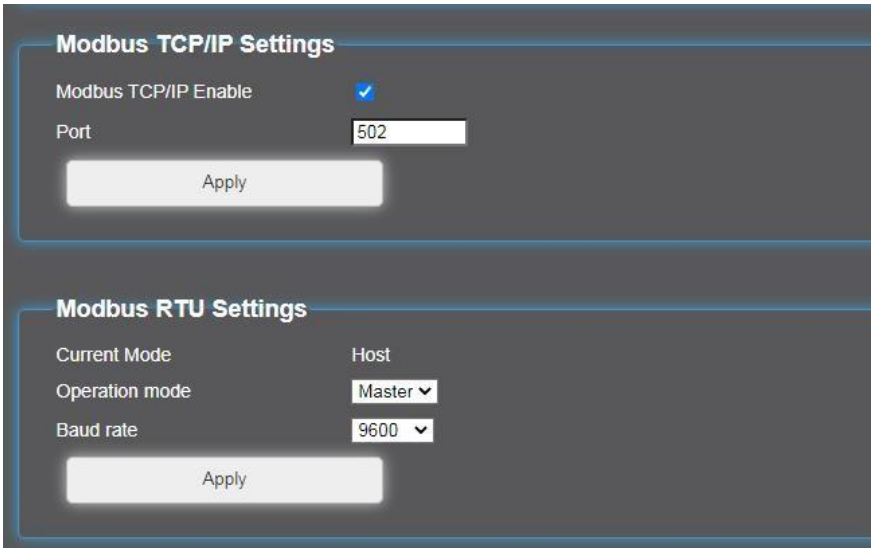
Additional note:

1. The PDU supports PING PONG upgrade. Even if the power is off during the upgrade, the PDU can still be upgraded after it is powered on again
2. The version and type of PDUs are mutually exclusive. Therefore, it is recommended to upgrade PDUs in batches through TFTP. After obtaining the firmware in TFTP, PDUs of the same version automatically refuse to upgrade to ensure that PDUs of the same version do not upgrade firmware repeatedly.
3. The PDU firmware is large. Therefore, wait until the upgrade is complete and ensure that the network is normal.
4. During the PDU upgrade, do not perform other operations, such as clicking buttons, using SNMP, and logging in to the web page.

1,

3.5.6 Modbus Settings

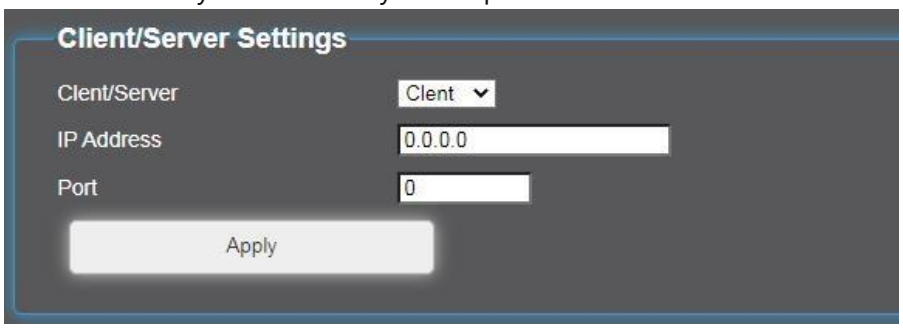
Pdus support ModbusRTU and ModubusTCP to copy data.



ModbusTCP is mainly for users to directly copy and read its content and data over the network, while ModbusRTU is for setting the master-slave mode of the current device (see Section 3.2).

3.5.7 Client/server Settings

PDU supports users to directly copy data through TCP server/client, which is convenient for users to carry out secondary development:



For the relevant agreement text, you may consult the relevant personnel of the Department.

3.5.8 Telnet Settings

PDU is only used by users to read or control devices through Telnet, or for secondary development:

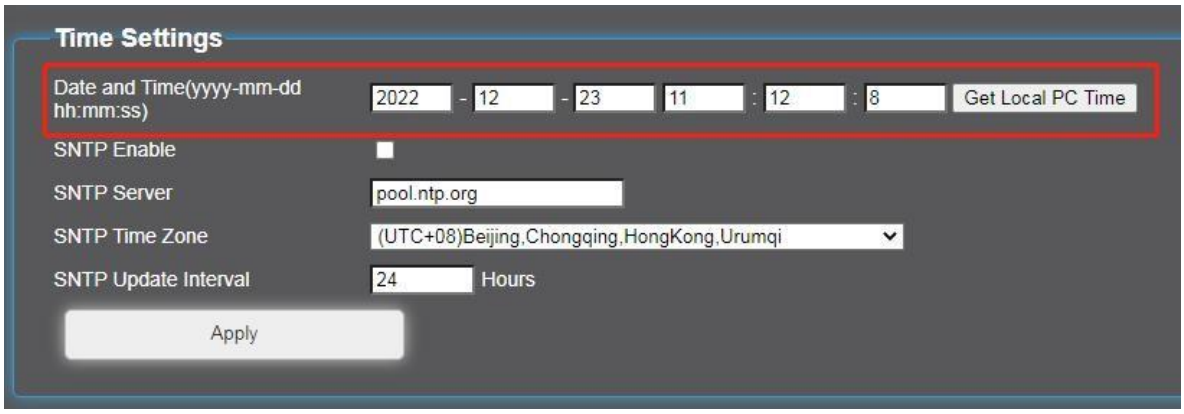
The default Telnet user name and password are admin. After the administrator user name and password are changed, the Telnet user name and password are also changed

3.6 System setting

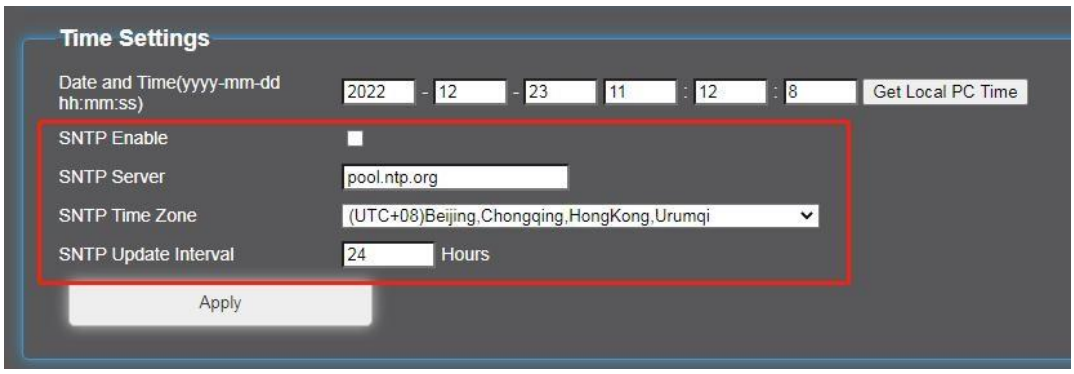
System Settings include relay Settings, sensor Settings, time Settings, user Settings, USB Settings, logs, tools, equipment information, etc.

3.6.1 Time setting

After receiving the PDU, you are advised to set the system time once to ensure system time accuracy.
The PDU can directly obtain the time of the current PC as the PDU time. It also supports the function of communicating with the NTP server.
If you use the current PC time as the PDU time, you can directly click Obtain PC Time and do not select Enable SNTP. Otherwise, the setting fails



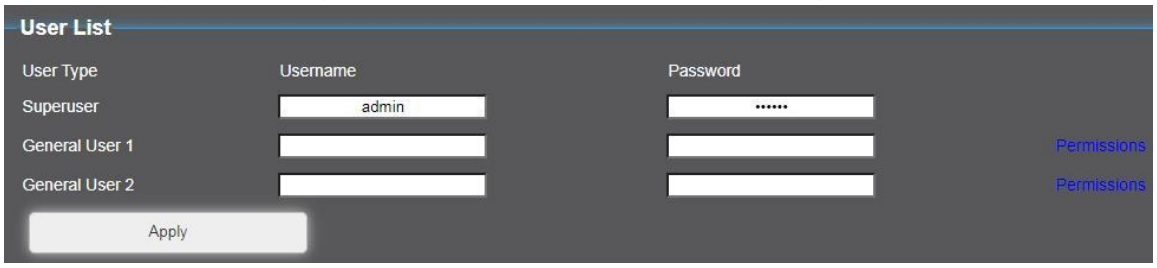
If the NTP server is used for time synchronization, you need to enable SNTP and set the SNTP server address, current time zone, and time interval:



After the configuration is complete, the PDU restarts, and the NTP server time is automatically obtained

3. 6. 2 User Settings

On the system Settings of the Web interface, click User Settings..

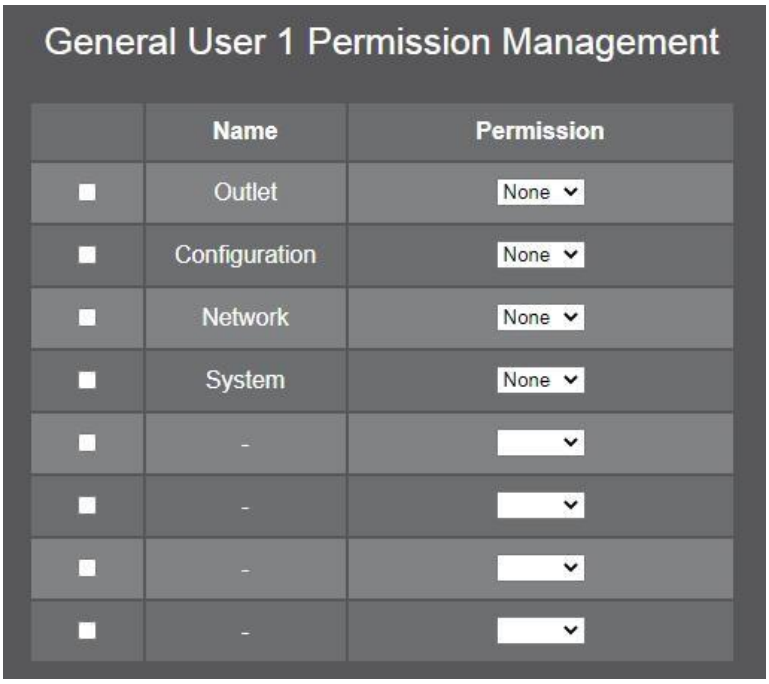


User Settings, used to add, modify, or delete a user. Three users can be added to the device: super user, user 1, and user 2.

The default user name and password of the administrator are admin. The administrator's username and password are mandatory, and you cannot leave either blank.

The username and password for users 1 and 2 are optional. You can close a common user account by leaving the user name and password blank. Common users have no permissions by default. The administrator can add access permissions for common users and click "Permission Setting" to set permissions

The super user has the highest permission on the device and can access or modify any options that can be set and modified. The super user can set read-write, read-only, and deny permissions for common users to access different interfaces, as shown in the figure



3. 6. 3 USB setup

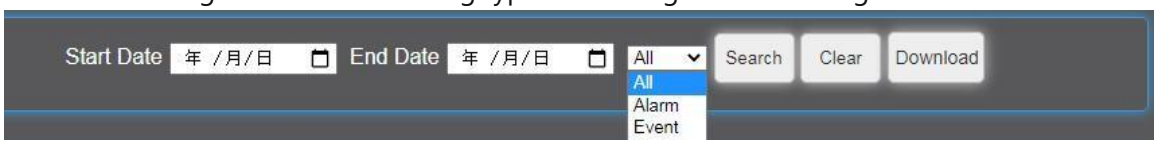
On the Web UI, click USB Settings.

The user can disable or enable the USB port through the current Settings, and can export logs through USB:

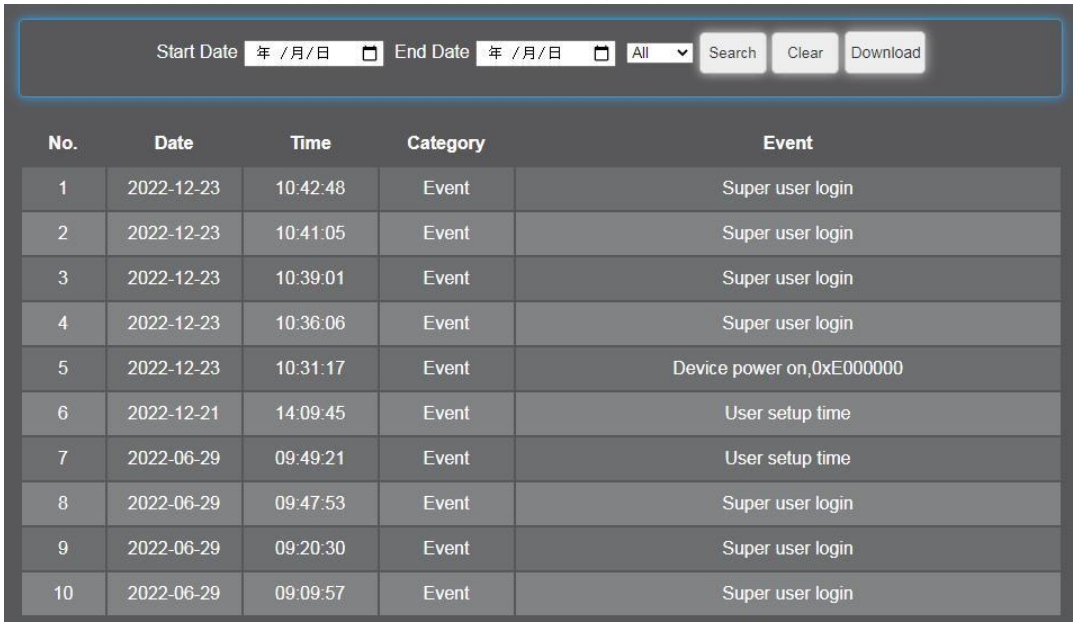
After you select Log Export, you can insert the PDU log information into the USB drive for analysis.

3.6.4 Log query

The PDU logs are of the following types: event logs and alarm logs:



You can select the log type to obtain the log information of the related type and time.:



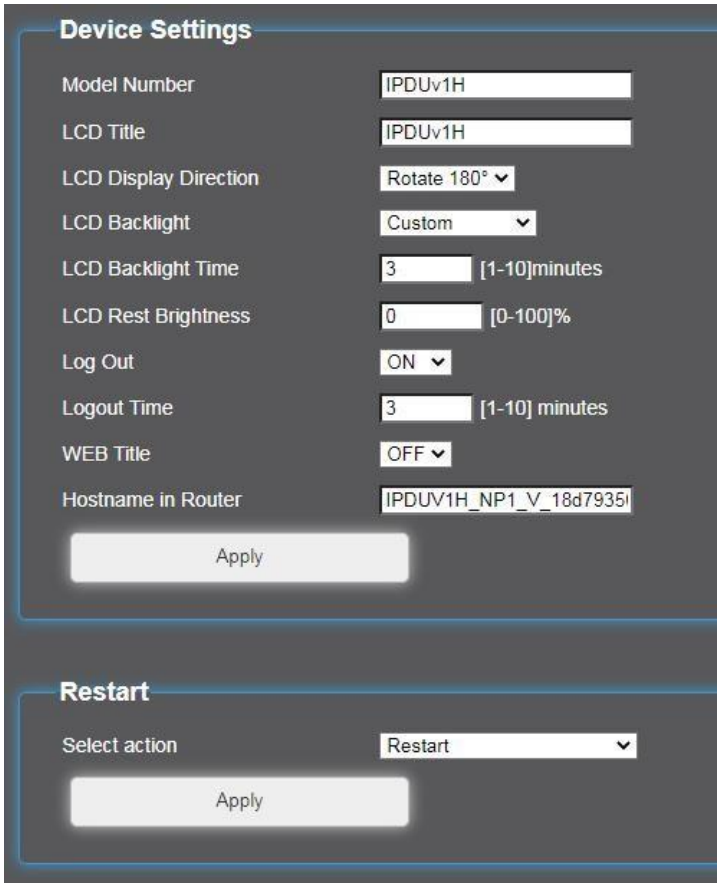
No.	Date	Time	Category	Event
1	2022-12-23	10:42:48	Event	Super user login
2	2022-12-23	10:41:05	Event	Super user login
3	2022-12-23	10:39:01	Event	Super user login
4	2022-12-23	10:36:06	Event	Super user login
5	2022-12-23	10:31:17	Event	Device power on,0xE000000
6	2022-12-21	14:09:45	Event	User setup time
7	2022-06-29	09:49:21	Event	User setup time
8	2022-06-29	09:47:53	Event	Super user login
9	2022-06-29	09:20:30	Event	Super user login
10	2022-06-29	09:09:57	Event	Super user login

By default, the storage system supports 1000 logs. When the logs are full, the storage system overwrites the logs in a rolling manner

You can also download logs. After you click the download button, logs are downloaded to the PC through the browser.

3.6.5 Tools

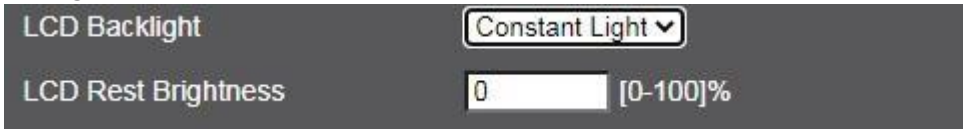
On the toolbar, you can customize the PDU and restart and reset the PDU:



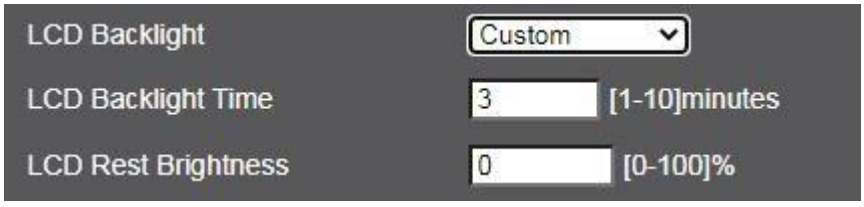
In the Model setting field, you can set a personalized name for the current PDU. In this way, the name is displayed in SNMP and device status.

LCD title and display direction item, you can set the LCD LCD title has been displayed direction, support rotation of 0/90/180/270 degrees four directions of the display, the factory will be set by default.

The LCD backlight supports PWM dimming and can be set to two modes: steady on and custom. Under steady on mode, the screen brightness can be set to 0~100%, as shown in the figure:

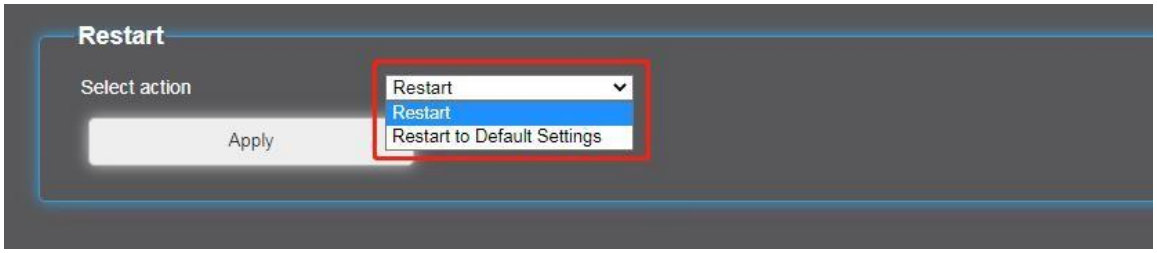


In the custom mode, the user can set the backlight time and the screen brightness, as shown in the figure. When the backlight time is up, the LCD will enter the screen state and keep the set screen brightness. When the user presses the button or an alarm occurs, the screen will restore to 100% brightness:



Automatic logout option, is to facilitate the user does not operate the web page, after the interval of how many minutes, automatically log out to the login interface, the default is 3 minutes, the user how to set to close, then the user login web page, will never log out. In Restart options, you can reset the PDU or restore parameters in the PDU:

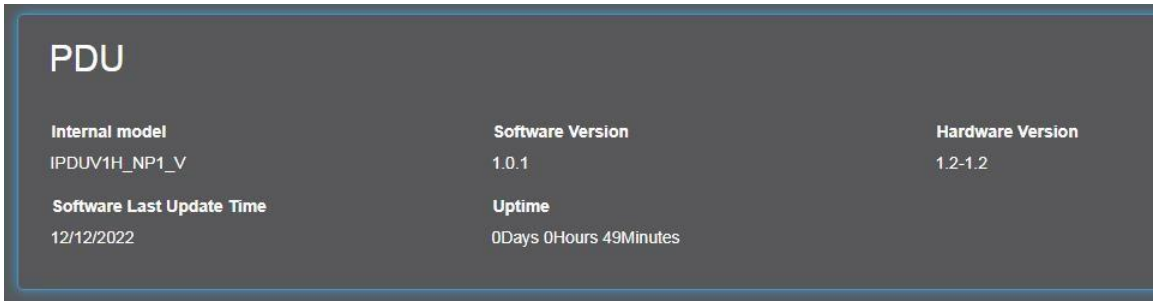
:



3.6.6 about

About the interface, it is to record the current PDU firmware and some parameters related to the running time:

The content cannot be changed by users. When users need to provide after-sales service for the current device, they can provide the current screenshot to our company, and our company can provide relevant after-sales service according to the information on the current interface



3.7 Other Settings

3.7.1 Display bar description

In the upper right corner of the interface, there is a current status bar. You can display the current login user, alarm status, logout, Chinese/English switching, and the current device time.

Click on different display content, you can quickly enter different interfaces

1) Click the current login user bar to enter the user setting interface
2) Click "Alarm" to go to the log view bar
3) Click "Logout" to exit the system and switch between different users to select login
4) After clicking "Chinese", the device switches to the English interface display

5) Click the current device time to enter the time setting interface

3.7.2 Obtaining IP Addresses

A PDU can obtain an IP address in the following ways:

First, after the PDU is connected to the router, it obtains the IP address assigned by the router in static or dynamic mode.

In the second mode, after the PDU is directly connected to a PC through a network cable, the PC is configured with a static IP address. If the PDU is on the same network segment as the PC, the PDU can be accessed directly.

Third, after the PDU is directly connected to a PC through a network cable, set a static IP address on the PC. If the PDU is set to obtain an IP address dynamically, set the IP address on the PC to 192.168.0.xxx. After about 15 seconds, The PDU automatically obtains a certain URL from 192.168.0.160 to 192.168.0.169. In this case, the PDU can be directly accessed without router participation.

Fourth, the user can directly set the dynamic or static address of the PDU through the LCD.

chapter Four troubleshooting

For problems that persist or are not described here, please contact our customer service center.

4. 1Frequently asked questions

problem	solution
Network disconnection	◆ check the network port of the LED indicator light is flashing, ensure the normal lights flashing ◆ integrity check the connection string ◆ Verify the PDU network Settings
inaccessible Web user interface	◆ Verify that you can ping through the ip address of the PDU ◆ Verify that you are using a Web browser that supports PDUs, see "Supported Web Browsers" ◆ validate input url is correct ◆ Reset the device

	InLCD, thedisplayof thecurrentstate, where green indicates connectivity or normal state, and red indicates disconnection or error The first item in the first row indicates whether the PDU hardware is normal The second line in the first row indicates the network connection status of the PDU The four dots in the second row, which are displayed only in host mode, indicate whether slave 1 to slave 4 is connected.
he parameters displayed on the LCD are garbled	◆ through the LCD to reset the device parameters ◆ through the Reset button to Reset the device parameters ◆ Still not solved, you can contact our after-sales treatment
	Indicator status description: kWh indicator: After the PDU is loaded, this indicator blinks irregularly Check whether the metering function is normal TX indicator: When the PDU serves as the host, this indicator indicates that the host sends the message from the slave When the PDU serves as the slave, this indicator indicates the read signal of the corresponding host of the slave to determine whether the cascading status is normal RUN indicator: When the PDU is running normally, this indicator is on and off at an interval of 1 second During firmware upgrades, or parameter resets, this light will blink rapidly and irregularly, indicating that the device is also in normal operation

4.2 SNMP problem

problem	solution
Unable to execute GET or SET	◆ verification community, see "SNMP Settings" ◆ validation is correct open UDP port 161 ◆ If SNMPv3 is used, check whether the parameters are correct
Unable to receive trap	◆ verify the trap proxy server IP address configuration is correct ◆ Verify that UDP port 162 is correctly opened
The trap received by esight is not recognized. Procedure	◆ Refer to the documentation received by your gateway to verify that these traps are properly integrated into the alert /trap database