IP-PDU product instruction manual

Orders to record

I. overview,

The AC-DC universal integration and hot-swappable IP-PDU network remote monitoring and management power distribution system is the latest scientific research achievement in the field of power distribution technology launched by Klewer in 2016.The product according to the international development trend of the power distribution management technology, combined with data center application environment of technology and market demand, the latest core technology with completely independent intellectual property rights, ac/dc general, network communication, monitoring and control, power distribution, technology etc. With hotplug and elaborate design standard remote monitoring management power distributor.

II. the main function

1. Remote monitoring of total working voltage;

2. Remote monitoring of total load current;

3. Remote monitoring of total load power;

4. Remote monitoring of total electric energy consumption;

5. Cabinet temperature and humidity microenvironment monitoring;

III. Scope of application

Applicable to 100VAC-240VAC single-phase AC power supply, 200VAC-400VAC three-phase AC power supply, the output of the maximum load current single-phase 63A, three-phase 3×32A, 100VDC-350VDC DC power supply, the output of the maximum load current 60A;It can meet the different needs of customers in different countries and regions in the world. The output unit can be selected according to the needs of the number of output units and output socket system.

IP-PDU is suitable for network communication, telecommunications and power, finance and insurance, aviation and aerospace, information processing, education and medical care, e-government, transportation, enterprise management and other industries data center network cabinets, server cabinets and other professional supporting equipment.

IV. Product schematic diagram
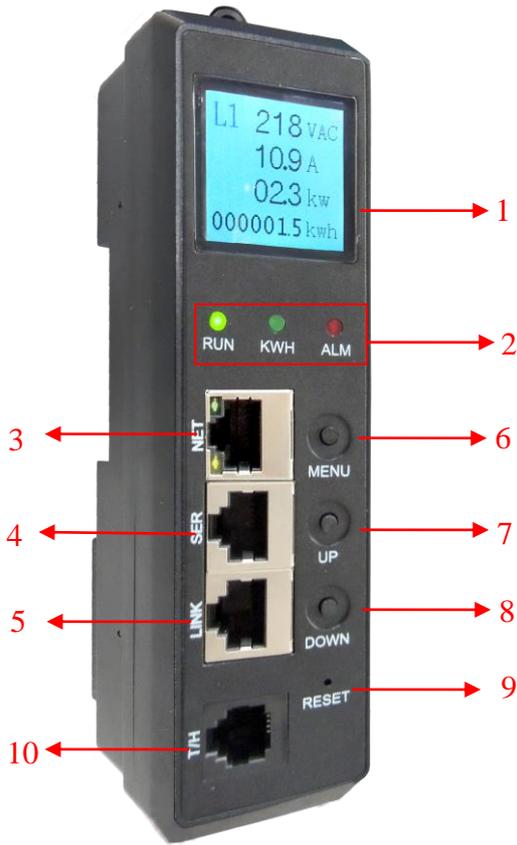
1, display screen: liquid crystal display;

2, RUN: running indicator light;

    KWH: Power indicator lamp;

    ALM: abnormal indicator light;

3、NET: network port;

4、SER: Cascaded port;

5, LINK: cascading port;

6, MENU: function key;

7. UP: Set the function key;

8, Down: positioning function key;

9, Reset: RESET button;

10, T/H: temperature and humidity sensor port.

V. Description of RJ45 terminal pin of RS485 interface
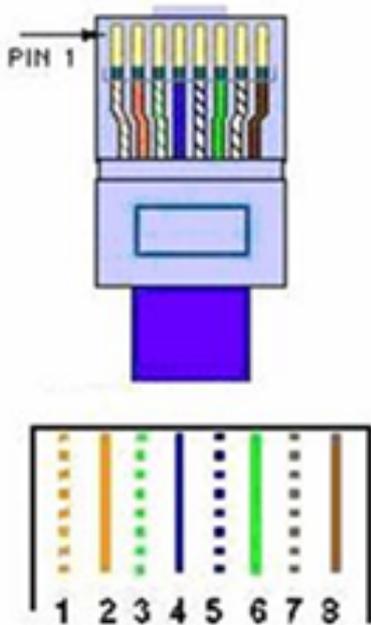
No.	Color	Instructions
1	Orange & White	GND
2	Orange	GND
3	Green & White	RS485-A
4	Blue	RS485-A
5	Blue & White	RS485-B
6	Green	RS485-B
7	Brown & White	GND
8	Brown	GND

VI. Installation method

Vertically fixed installation.

VII. Hardware Instructions

1.Panel function introduction:

panels	function	Directions for use
RUN	Product running status indicator light	Status: flashing at 1 second interval between bright and off
KWH	Power running indicator light	State: flicker, flicker frequency is determined by the load current value
ALM	Warning abnormal indicator light	State: Constantly bright, when voltage, current, temperature and humidity exceed the threshold
NET	Network port	WAN/LAN communication interface
SER	Cascade port	RS-485 communication interface
LINK	Cascade port	RS-485 communication interface
MENU	Menu function key	Turn the page to view the contents of the display screen, light the backlight of the LCD screen, and save the determination of the Settings; Restore factory Settings: press MENU button and press RESET button at the same time. After about 3 seconds, release MENU button
UP	Set function key	Set the device communication address code, current upper limit threshold, voltage upper limit threshold, temperature and humidity upper limit threshold value for 0-9 cycles
DOWN	Positioning function key	Set the device communication address code, current upper limit threshold, voltage upper limit threshold, temperature and humidity upper limit threshold value to cycle from low to high
RESET	Reset button	Restart the system
display	View the status of the data	Display the data status and alarm status monitored by the machine
T/H	Temperature and humidity sensor port	

2.Power on start self - test

At the moment when PDU is powered on, the LED indicator light on the panel and the LCD display screen are initially displayed, the RUN indicator light flashes and the product enters the normal working mode.The following are DC module, AC single-phase module, AC three-phase module product related LCD content introduction.

2.1 DC function module:

（Figure 1） （Figure 2） （Figure 3） （Figure 4）

（Figure 7） （Figure 6） （Figure 5）
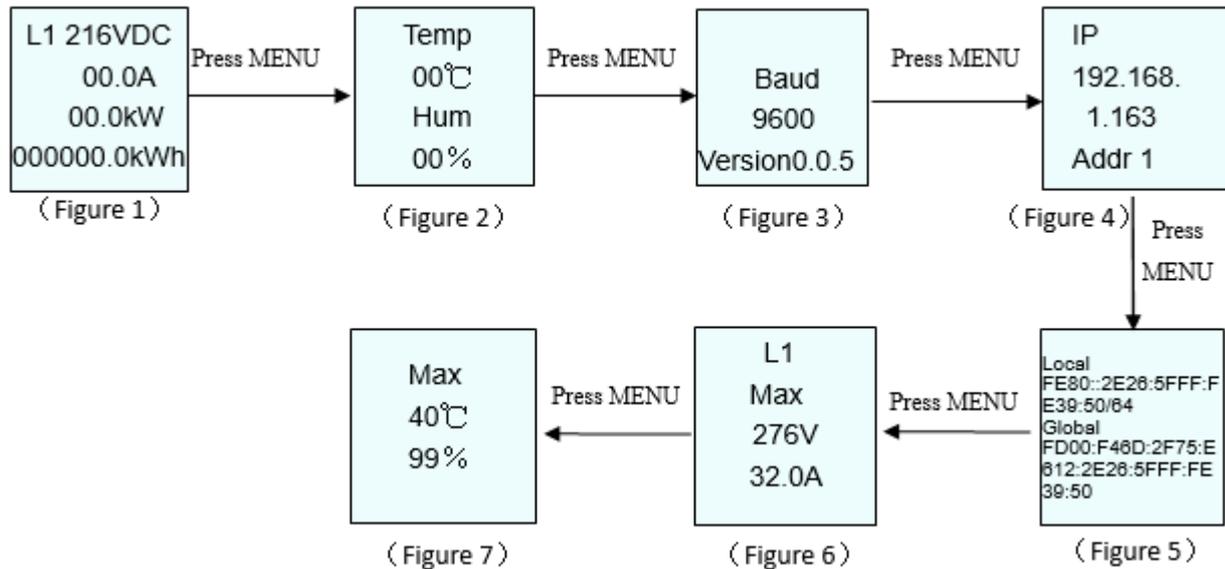
The first screen displays: voltage (216VDC), current (00.0A), power (00.0kW), electric energy (000000.0kWh) values (Figure 1).

The second screen displays: Temp 00°C Hum 00% (value monitored by the temperature and humidity sensor) (Figure 2).
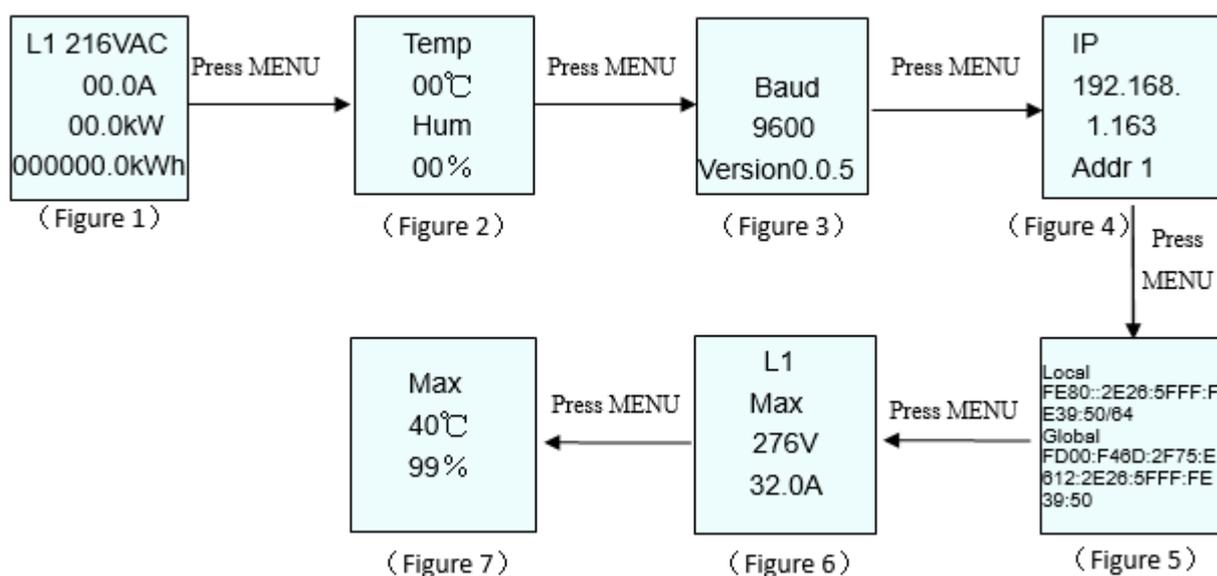
The third screen displays: Baud 9600 (device baud rate), Version0.0.5 (software version number) (Figure 3).

The fourth screen displays: IP 192.168. 1.163 (device IPV4 address), Addr 1 (master and slave address code, setting range: 0-4) (Figure 4).

The fifth screen displays: Local (displays the device's IPV6 local address, and this interface does not display when the IPV6 function is turned off), Global (displays the device's IPV6 global address, and this interface does not display when the IPV6 function is turned off) (Figure 5) .

The sixth screen displays: current upper threshold (32.0A), voltage upper threshold (276VAC) (Figure 6).

The seventh screen displays: temperature upper threshold (40°C), humidity upper threshold (99%) (Figure 7).

2.2 AC single-phase function module:

The first screen displays: voltage (216VAC), current (00.0A), power (00.0kW), electric energy (000000.0kWh) values (Figure 1).

The second screen displays: Temp 00°C Hum 00% (value monitored by the temperature and humidity sensor) (Figure 2).

The third screen displays: Baud 9600 (device baud rate), Version0.0.5 (software version number) (Figure 3).

The fourth screen displays: IP 192.168. 1.163 (device IPV4 address), Addr 1 (master and slave address code, setting range: 0-4) (Figure 4).

The fifth screen displays: Local (displays the device's IPV6 local address, and this interface does not display when the IPV6 function is turned off), Global (displays the device's IPV6 global address, and this interface does not display when the IPV6 function is turned off) (Figure 5) .

The sixth screen displays: current upper threshold (32.0A), voltage upper threshold (276VAC) (Figure 6).

The seventh screen displays: temperature upper threshold (40°C), humidity upper threshold (99%) (Figure 7).

（Figure 1）　（Figure 2）　（Figure 3）　（Figure 4）　（Figure 5）　（Figure 6）　（Figure 7）

2.3 AC three-phase function module:

The first screen displays phase (L1): voltage (216VAC), current (00.0A), power (00.0KW), electric energy (000000.0KWh) values (Figure 1).

The second screen displays phase (L2): voltage (216VAC), current (00.0A), power (00.0KW), electric energy (000000.0KWh) values (Figure 2).

The third screen displays phase (L3): voltage (216VAC), current (00.0A), power (00.0KW), electric energy (000000.0KWh) values (Figure 3). The fourth screen displays: Temp 00°C Hum 00% (value monitored by the temperature and humidity sensor) (Figure 4).

The fifth screen displays: Baud 9600 (device baud rate), Version0.0.5 (software version number) (Figure 5).

The sixth screen displays: IP 192.168. 1.163 (device IPV4 address), Addr 1 (master and slave address code, setting range: 0-4) (Figure 6).
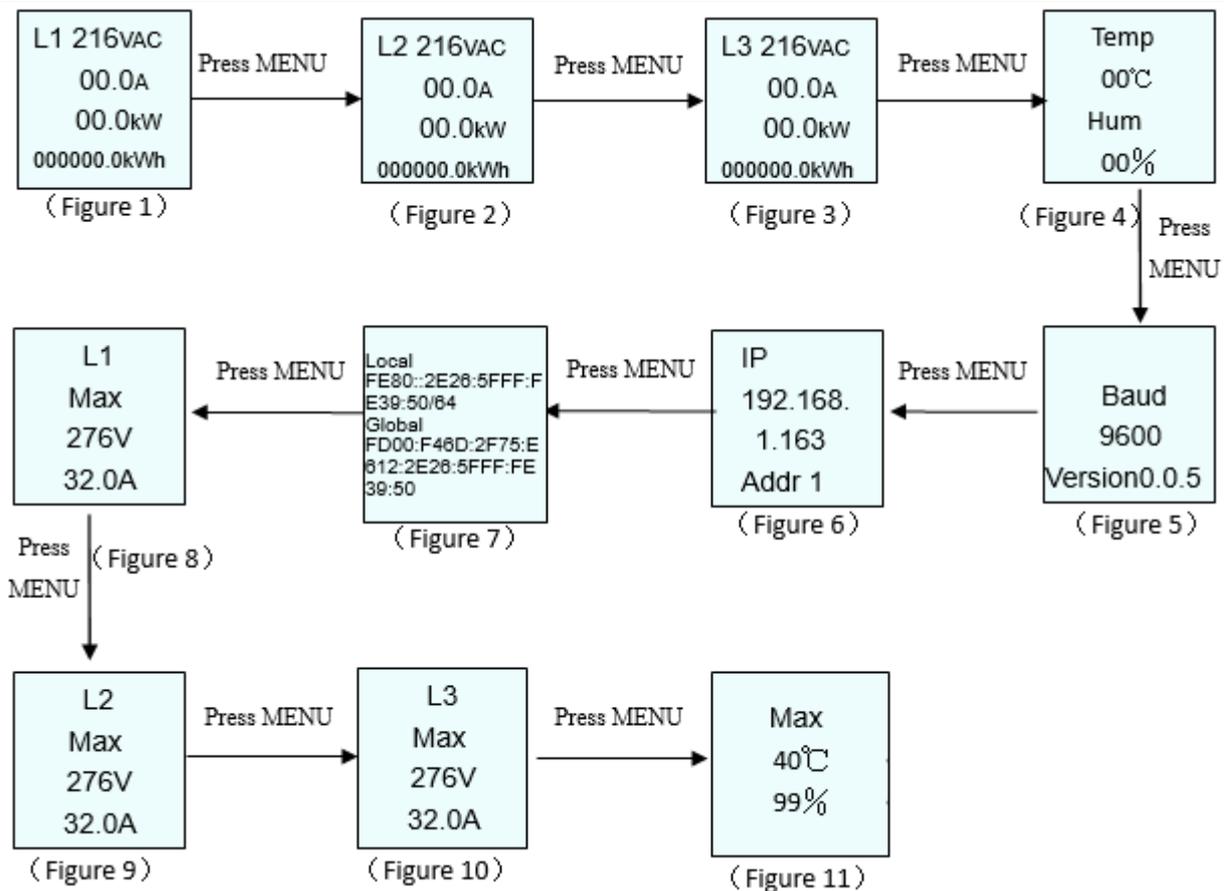
The seventh screen displays: Local (displays the device's IPV6 local address, and this interface does not display when the IPV6 function is turned off), Global (displays the device's IPV6 global address, and this interface does not display when the IPV6 function is turned off) (Figure 7) .

The eighth screen displays: L1 current upper limit threshold (32.0A), L1 voltage upper limit threshold (276VAC) (Figure 8).

The eighth screen displays: L2 current upper threshold (32.0A), L2 voltage upper threshold (276VAC) (Figure 9).

The eighth screen displays: L3 current upper limit threshold (32.0A), L3 voltage upper limit threshold (276VAC) (Figure 10).

The ninth screen displays: temperature upper threshold (40°C), humidity upper threshold (99%) (Figure 11).

| L1 216VAC
00.0A
00.0kW
000000.0kWh
（Figure 1） | Press MENU → | L2 216VAC
00.0A
00.0kW
000000.0kWh
（Figure 2） | Press MENU → | L3 216VAC
00.0A
00.0kW
000000.0kWh
（Figure 3） | Press MENU → | Temp
00℃
Hum
00%
（Figure 4） |

Press MENU

| L1
Max
276V
32.0A
（Figure 8） | ← Press MENU | Local
FE80::2E26:5FFF:F
E39:50/64
Global
FD00:F46D:2F75:E
612:2E26:5FFF:FE
39:50
（Figure 7） | ← Press MENU | IP
192.168.
1.163
Addr 1
（Figure 6） | ← Press MENU | Baud
9600
Version0.0.5
（Figure 5） |

Press MENU ↓

| L2
Max
276V
32.0A
（Figure 9） | Press MENU → | L3
Max
276V
32.0A
（Figure 10） | Press MENU → | Max
40℃
99%
（Figure 11） |

3.Hardware setup

3.1 Setting of the device's communication address code: turn to the page of the device's communication address code through the MENU button (the LCD display is shown as ADDR 01);

Press UP to change the value of address code upward, and press MENU to save it;

Press DOWN key to change the value of address code downward, press MENU key to save;

3.2 Threshold setting of current, voltage, temperature and humidity: turn to the setting page of current, voltage, temperature and humidity threshold through the MENU button (LCD screen display) Shown as L1 32.0A, 276VAC);

Press the DOWN button repeatedly to select the low or high current or voltage value, temperature and humidity threshold, and select the position

Value flicker of;

Press UP button repeatedly to change the value from 0 to 9. The system allows setting the maximum current of 32A and maximum voltage of 276VAC.

Note: Please press MENU button to confirm the above hardware Settings, and the Settings will take effect after the device buzzing is restarted;Otherwise, the setting will be invalid after 10 seconds and the setting information will not be saved.

3.3 Restore factory settings: Press the reset button while holding down the MENU button. After about 3 seconds,

you will hear the sound of beeping. Release the MENU button until the display screen displays normally.

3.4 Alarm buzzer switch: When the device generates an alarm, press and hold the MENU button for about 3

seconds to turn on or off the alarm buzzer function;

4. Cascading connection method

4.1 Network interface protocol hand in hand cascade:

4.1.1 Set one host and the others as slaves. Connect one end of the direct connection cable to SER port of the host

and the other end to LINK port of the slave. Then connect a cascading connection cable from SER port of the

current slave to LINK port of the next slave, and connect each slave successively.
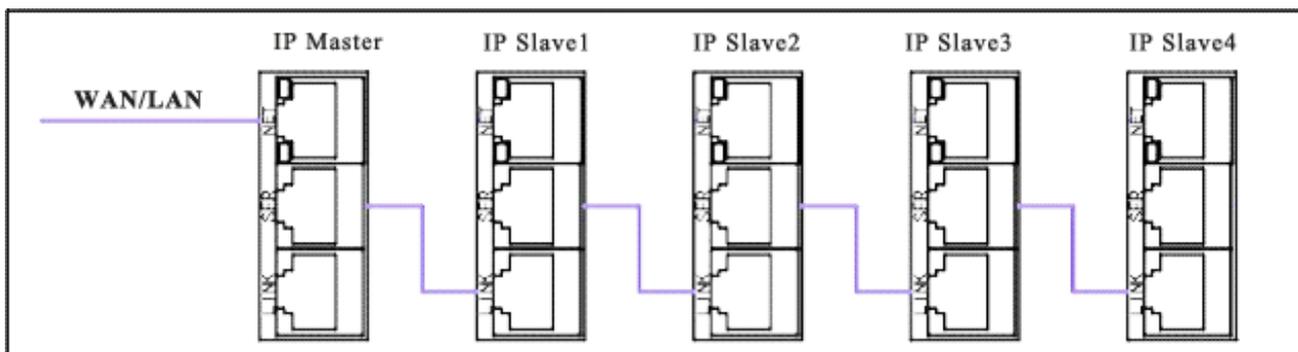
Network interface protocol hand in hand cascade

4.1.2 Connect one end of the cable with a direct network cable to the NET PORT, and the other end to the PORT

PORT of HUB.There is no limit on the number of cascades. The cascading connection is as follows:
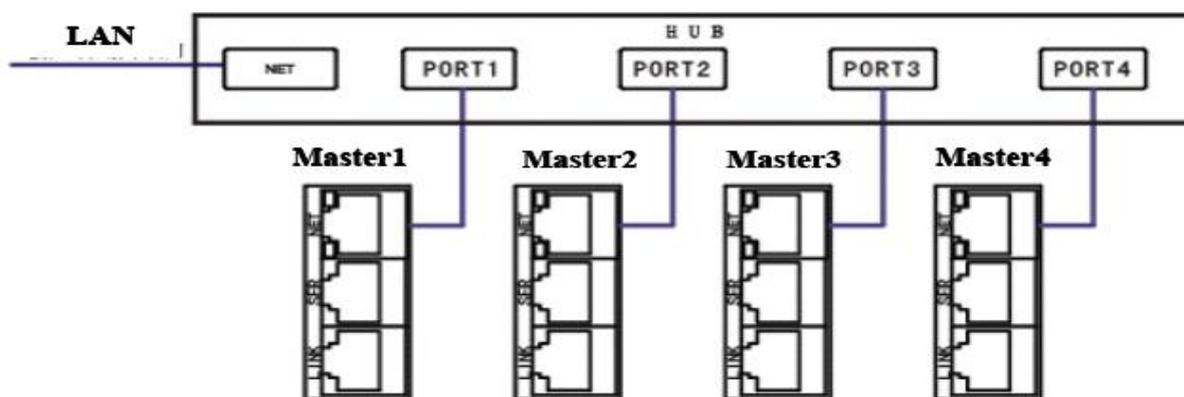
Network port protocol bus cascade

4.2 Serial protocol hand in hand cascading:

4.2.1 Connect the serial port and cascading port of each device respectively to form a hand-in-hand cascading

square test. The maximum number of cascading units can be 32. The cascading connection is as follows:
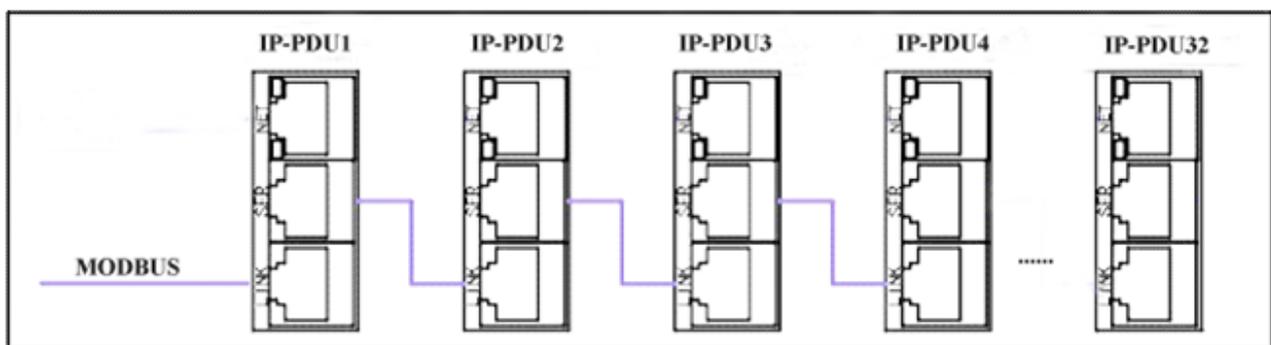
Serial port protocol cascading

　　Note: Network hand in hand cascading mode and serial port hand in hand cascading mode can only choose one of the two.

VIII. Software Instructions

　　IP-PDU has four access modes: Web access (Web access control via IE);SNMP access (SNMP (VL/V2C /V3) via standard network management workstation access control);Telnet (command line console);Modbus RTU (serial interface).

1. Web access mode

　　Users can monitor and control through Internet Explorer (compatible with Internet Explorer9.0 or above version, Google Chrome, Firefox and other mainstream browsers), SNMP (V1/ V2C /V3), Telnet (network command line monitoring), Modbus RTU (serial interface) and other access methods.

　　Open the browser and enter the IP address of the device in the address bar (the factory default IP of the system is https://192.168.1.163, and you can press MENU to turn the page to view the IP address display). When you log in for the first time, the system will pop up a window to create a new account, and the user login window will pop up as shown in Figure 1 below:

Figure 1

　　The user name and password should be 6-10 characters and a combination of letters and numbers. After successfully creating the username, enter the login window, as shown in Figure 2:

Figure 2

Enter your user name and password to log in.

Note: If the user name and password failed 5 times in a row, the login verification can be continued after 10 seconds delay. If the authentication fails 15 times in a row, the system will lock and cannot continue the login verification. The login verification can be resumed after restarting the device or 1 hour later.

The user name and password are verified, and the system is logged into the main interface, as shown in Figure 3:

Note: After successfully logging in, if there is no page operation within 20 minutes, the user will automatically log out of the system and need to log in again.

Figure 3

The main page of the system is divided into three parts: company Logo, product name, menu bar and main interface.

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A. Equipment status

Click the jump page of equipment status, as shown in Figure 3, and the main page will display the output power status (AC or DC) of the equipment, load current, working voltage, power factor, apparent power, active power, frequency and total power consumption, as well as the temperature and humidity sensor status.

Output: Line 1 ▼ Check the load current, working voltage, power factor, active power, apparent power, total power consumption, frequency, temperature and humidity of L1, L2 and L3 through the pull-down menu.(There is no drop-down menu for single-phase series)

PDU: Master ▼ Through the drop-down menu, check the three-phase electrical parameters of the main and auxiliary engines.1 main engine can cascade 4 auxiliary engines (auxiliary engine 1 - auxiliary engine 4).

B. Threshold setting

Threshold setting page, you can set the total load current, total voltage, temperature and humidity for upper and lower limits. As shown in Figure 4:

Figure 4.

The upper and lower thresholds of current, voltage and temperature and humidity can be set for main and auxiliary engines L1, L2 and L3.

Current range: single-phase AC 0-63A, three-phase AC 0-32A, DC 0-60A;

Voltage range from 80-276 (single phase series without LINE2 and LINE3 thresholds set)

Sensor temperature range 0-40℃, humidity range 0-99%

C. Device Settings, as shown in Figure 5:

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A. Equipment setting:

Device Name: Enter the device name in the input box and click Save.

Muffler function: select "Open" to enable alarm buzzer muffle function;Select "off" to turn off the alarm buzzer muffler function.

LCD orientation: display direction can be set to 4 directions: horizontal, vertical, horizontal flip, vertical flip.

Working mode: Modify main and secondary engine mode. Secondary engine (value is 1-4).

Note: The above will take effect after restarting the device.

B. Power setting:

LINE1 Power: Click the button "Clear". Power on Line2 and Line3 clears to zero as on Line1. (The single-phase series products do not have the power reset of LINE2 and LINE3)

Figure 5

D. User Settings: as shown in Figure 6:

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Figure 6.

User Settings can be modified to the user name and password. After confirming the password, click "Save" to modify the password successfully.(User names and passwords can be up to 10 characters in length).

Note: User and password length is limited to 6-10 characters of combination of numbers and letters, setting beyond the range will fail.

E. Network Settings: as shown in Figure 7:

Network Settings:

SSL mode port: Set SSL port number and save it, restart the device system, and the setting takes effect:

Encryption mode (SSL), the port number is 443 by default

Note: The system needs to be restarted after the network configuration information is modified.

IPV4 settings

Protocol: Static Address

IP address: 192.168.1.163 (factory IP address);

Subnet mask: 255.255.255.0

Gateway: 192.168.1.1

DNS address: the default is 0.0.0.0; make sure to fill in the correct DNS address, and the alarm email can be sent normally.

Protocol: Obtain automatically (DHCP protocol)

"DHCP Settings" is disabled by default. Select the "DHCP" mode, click the "Save" button, and restart the device system. The IP address will be automatically obtained according to the routing settings in the local area network where the device is located, and the IP address can be viewed through the device display.

IPV6 settings

Enable/disable IPV6 service: disabled by default, can be manually set to enable

IP address setting: the default is a static address protocol, which can be manually set to a dynamic address protocol

Protocol: Static Address

The default is a static address protocol, and the IPV6 address can be manually set. IPV6 consists of 8 groups of numbers and letters from 0 to 9 and A to F, and then separated by colons, such as FE80::2E26:5FFF:FE3C:797/64, /64, /48, /32 of ipv6 followed by the address is Refers to the prefix length of the IPv6 address (the prefix, that is, the first 64 bits or 48 bits or 32 bits of the address have the same length)

Protocol: SLAAC (Dynamic Protocol)

Disabled by default. Select the "SLAAC" mode, click the "Save" button, restart the device system, and automatically obtain the IPV6 address according to the routing settings in the local area network where the device is located. You can check the IPV6 address page.

Link-local address: the scope of the address is only local, and the function is local communication;

Global address: the scope of the address is global and can be propagated globally

DNS: Be sure to fill in the correct DNS address so that the alarm email can be sent normally;

Note: After modifying the network configuration information, the system needs to be restarted.

Telnet settings

Select "On" or "Off" to enable the Telnet function, and the default is "Off";

The Telnet account and password are the same as the login system account and password, and the port number of Telnet is 23;

Note: The system needs to be restarted after the network configuration information is modified.

F. SNMP is shown in Figure 8:

SNMP-Trap alarm mode can be selected, and the default is SNMPv1-Trap.

SNMP agent V1 / V2C Settings, the default is off, GET community, SET community defaults to public and private;

SNMP agent (v3) setting, the default is enabled, can be used after filling in the account number, password and secret key.

Trap IP: Enter the target address of SNMP management platform in the input box of "Trap Address", and Trap information will be automatically sent to the corresponding address. A total of 2 Trap addresses can be set.

Note: SNMP configuration information is saved and needs to be restarted to take effect.

Figure 8.

G. Email alarm setting, as shown in Figure 9:

Correct configuration of SMTP service related parameters, correctly fill in the SMTP box account, password, server address, working mode

(SMTP/SMTPS) and the inbox address. Click the "Save" button to restart the device system and the Settings will take effect.

Click the "Testing" button to check the test email. If you receive the test email, SMTP is set successfully;

otherwise, please reset it.

Figure 9.

H. Time calibration setting（optional）, as shown in Figure 10:

SNTP time calibration shows the current time of the device, which is also the time of log record acquisition;

Figure 10.

a. Local time calibration

Local time, click "Get Time", the device system time will be updated according to the user's local time;

b. Network time calibration

Network time. Click "Get Time", the device will obtain the time and date of the selected time zone from the network and update the system time of the device according to the NTP server address and time zone set by the user.

Note: Enable SNTP network time calibration to ensure that the product is used in the WAN.

I. Log（optional）, as shown in Figure 11:

Log types: alarm logs and operation logs.

Log information: log time, log type, detailed information.

Log capacity: the maximum storage of about 300 records, 300 records will automatically delete the first log record.

Log View: Click the current page number to view, log information immediately jump to this page.

Log records can display up to 20 pages, each page of 15 log records, more than 20 pages of log records, the system will automatically delete the first record.

Log deletion: click the clear button, the device prompts whether to delete the log, click OK, delete all logs, click Cancel, delete failed.

Log export: Only IE, Google, and Firefox can export the current page log record in.xls table format.

Figure 11.

J. Restart Settings: Click Restart, as shown in Figure 12:

Select command: Optionally restart the device and restore factory Settings. Confirm to save, the network is disconnected and the hardware screen is lit, then the device is restarted successfully.

Note: The operation of hardware recovery factory setting is to press MENU button and press RESET button (or press MENU to power up).
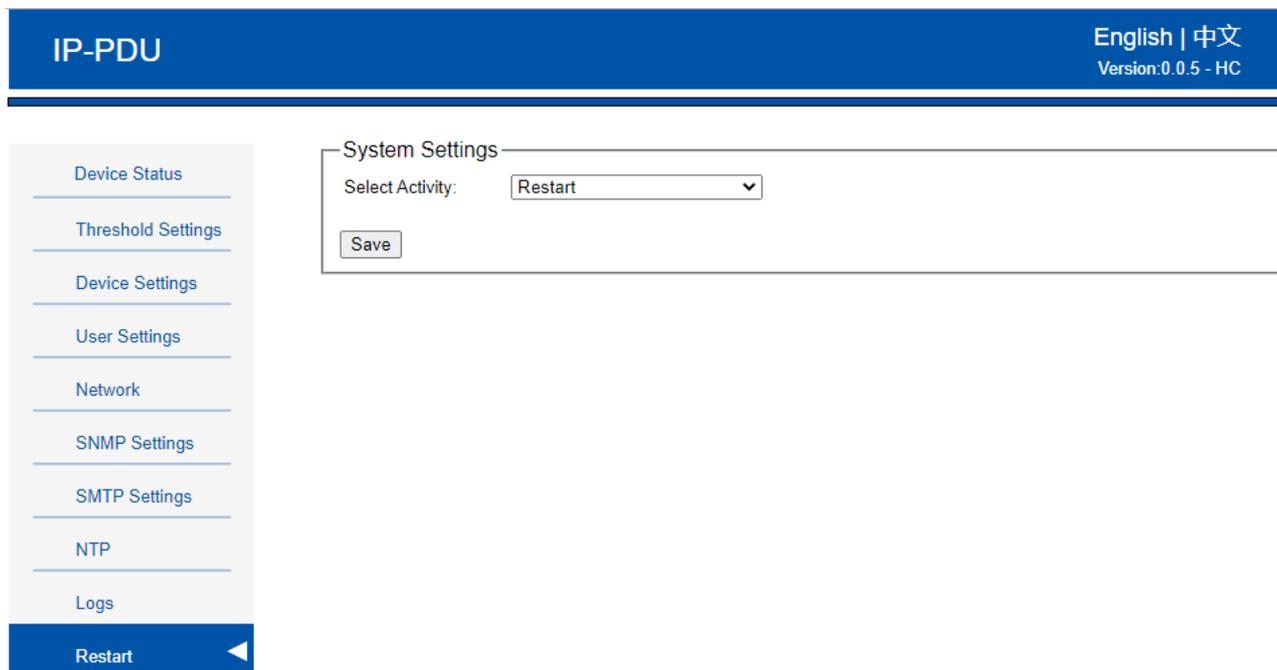
<p align="center">Figure 12</p>

2. SNMP access

This software supports the V1, V2C, V3 versions of SNMP. The attachment provides MIB Protocol file, which contains a company enterprise number. The Network Management system uses the SNMP Protocol to carry out the equipment

Network management, can view equipment and sensor status information, alarm to receive information.

After the SNMP setting is completed and turned on, the corresponding SNMP management software shall be installed.

Please refer to the corresponding protocol description for the OID of the SNMP protocol management device information.

3. Telnet access mode

Telnet application is convenient for remote login, providing users with the ability to remotely control the work of the device, enter the user name and password to conduct a session. Terminal users can control it by inputting commands in the Telnet program, which can provide better response. The required configuration of Telnet and the client need to use the PC client agent. There are many free shareware or SSH

clients, such as the free PuTTY client software.

Telnet control monitoring management equipment, mainly through the STATUS, REBOOT, RESET, HELP and other command line management control.

A, the STATUS

"Status" command line can view the device's master and slave mode, total current, total voltage, apparent power, total electric energy, temperature and humidity sensor STATUS according to the options;

Command line input format: STATUS

Example: Status: Check the host's total current, total voltage, apparent power, total electric energy, temperature and humidity sensor status, as well as the upper and lower threshold status of total voltage, total current, temperature and humidity.

B, REBOOT

Type the REBOOT command and the device restarts.

C, the RESET

Enter the RESET command and the device will resume factory Settings.

4. Modbus-RTU access mode

Modbus RTU access adopts two-wire RS-485 serial communication port for serial access. Please refer to MPDU Modbus RTU Protocol and Usage Instructions for access protocol.

Modbus-RTU protocol Settings: including Modbus-RTU address (1-99), baud rate (4800,9600,19200,38400),

Note: Data is collected through SER/LINK port. Please refer to Modbus-RTU protocol for details.

IX. Technical parameters

No.	The performance parameters			Technical indicators
1	The input features	Single phase	Rated input voltage	110/220V 50/60Hz
			Maximum total load current	16A, 32A, 63A
		three-phase	Rated input voltage	380V 50/60Hz
			Maximum total load current	3 x 16 a, 3 x 32 a
		dc	The rated voltage	240V /336V
			Maximum total load current	40A / 60A
		Cable specification		16 a: 3 x 2.5 mm^{2}A: 32 x 3 m x 6.0 3 mm^{2}X 3 m 63 a: 3 x 16.0 mm^{2}X 3 m 3 x 16 a: 5 x 2.5 mm^{2}32 a: 3 x 3 m x 5 x 6.0 mm^{2}X 3 m
		Input terminal type		16A standard configuration: 3×2.5mm^2×3M IEC60320 C20 port

				32A standard configuration: 3×6.0mm^2* 3M IEC60309 2P+E industry standard plug
				63A standard configuration: 3×16.0mm^2* 3M IEC60309 2P+E industry standard plug
				3×16A standard configuration: 5×2.5mm^2* 3M IEC60309 industry standard plug
				3×32A standard configuration: 5×6.0mm^2* 3M IEC60309 industry standard plug
		Overload protection		Open circuit protector (optional)
2	Output characteristic	Single phase	The output voltage	110/220VAC
			Maximum total load current	16A, 32A, 63A
		three-phase	The output voltage	220V
			Maximum total load current	3 x 16 a, 3 x 32 a
		dc	The rated voltage	240V /336V
			Maximum total load current	40A / 60A
		Output socket system		See "Output Sockets" for details
		Output unit specification		Customized production is acceptable
3	According to characteristics of	Display mode		LCD display;
		According to the content		Total voltage, total current, total power, total electric energy consumption, IP address, communication address code, temperature and humidity value;
		Display precision	The total voltage	Accuracy: ±1% RDG.±3dgt. Resolution: 1V Response time: 400ms Display mode: LCD display;　　　　　Display direction: vertical, horizontal, vertical flip, horizontal flip;
			The total current	Accuracy: ±1%rdg.±2dgt. Resolution: 100mA Response time: 400ms Display mode: LCD display;　　　　　Display direction: vertical, horizontal, vertical flip, horizontal flip;
			The total power	Detection accuracy: 1%; Resolution: 0.1kWh Response time: 400ms Display mode: LCD display;　　　　Display direction: vertical, horizontal, vertical flip, horizontal flip;
5	Physical properties	Property of shell material		ABS+PC
		The shell color		Black;
	Overall dimensions	Integrated IP-PDU module		155mm
		Hot-swappable IP-PDU module		180mm

6	installation	Vertical fixed installation;	
7	Monitoring function	Total load current monitoring;	
		Total input voltage monitoring;	
		Total load power monitoring;	
		Total electric energy consumption monitoring;	
8	Set the function	Setting of total load current, total load voltage, upper and lower limits of temperature and humidity;	
		Address Settings for email alerts;	
		HTTP network service Settings	
		SNMP (V1/ V2C /V3) setting	
		Network parameter setting (IP, gateway, mask, DNS)	
9	The alarm function	system The alarm	The total load current exceeds the rated value
			When the total voltage exceeds the rating
		Custom alarms	When the total load current exceeds the threshold
			When the total load voltage exceeds the threshold
			When the temperature and humidity exceed the threshold
		The alarm way	A buzzer beeps
			Automatically send E-mail to system administrator
			SNMP sends TRAP alarm status information.
10	Centralized monitoring function	Clever Manager enables centralized monitoring, monitoring and management of devices;	
11	access	Web access control through IE;	
		SNMP (V1/ V2C /V3) manages workstation access control through standard network;	
		Telnet command line console access	
		Modbus serial communication protocol access mode	
12	User management	User name and password setting;	
13	The environment	Working	0 ℃ ~ 45 ℃
		Relative humidity	5 ~ 95%
		Storage	- 20 ℃ ~ 70 ℃

X. Quality assurance

This product is guaranteed for two years from the date of purchase. The Company's basic obligations during the warranty period are limited to replacement, repair or return to the Company for repair. Generally, free maintenance is provided for customers during the warranty period. An appropriate fee will be charged if the product is out of warranty or if the company determines that the product is due to illegal handling.

The above warranty does not apply to problems caused by:

1. Failure caused by incorrect or improper maintenance by the customer.

2. Failure caused by unauthorized alteration, modification or misuse.

3. Failures caused by use in environments outside the scope of the physical environment specified by the product.

Maintenance matters needing attention:

1. If you need to return the product for repair, please make sure that it is packaged in a protective hard box. Damage during transportation is not covered by the warranty.

2. Please give a brief description of the product problems and the operation process.

3. The customer will need to prepay the shipping cost of the product back to us and will pay all duties and taxes.

Please write down your name, address and a telephone number which can be reached at any time.