

Monitored PDU Instruction



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1. OVERALL SUMMARY

Intelligent Monitored PDU(Power Distribution Unit) can be applied to servers, switches, cabinets and other electronic and electrical equipment. Besides, it can monitor the electricity consumption information and environmental information of the electronic and electrical equipment on the intelligent monitoring power distribution unit, and supports the remote access.

Intelligent Monitored PDU based on intelligent power management, built-in various sophisticated sensors, real-time detection of the interface current, voltage, and environmental temperature and humidity (optional), independent analysis of reasonable power consumption and excess alarm through the integrated circuit and embedded firmware, to display on the LCD screen.

The product can also realize cascading through the RS485 interface, which fully supports the Modbus communication protocol. Up to 64 devices can be cascaded, and at the same time can be connected with the upper computer, through the upper computer software, real-time management of all online alarm and reminder, to provide large digital data analysis and comparison, to achieve the collective energy saving and safe electricity goal.

In the installation, wiring and functional testing can be easily completed through RS485 bus, to set the serial port rate, monitoring, etc through the upper connection or offline way.

2. OPERATING ENVIRONMENT

Project	unit	Max.	Benchmark	Mini
Input voltage	V	300	220	176
Voltage accuracy			±1%	
Measured current	I	63	63	0
Current resolution			0.1 A	
Measured power	W	-	-	0
Input frequency	Hz	63	50/60	47
Environment temperature	°C	60	-	- 10
Storage temperature	°C	85	-	- 40
Environmental humidity	% RH	85	-	5

Table 1

※ In use, avoid operating under the highest temperature and humidity at the same time

3. DETECTION AND DISPLAY

- Alarm function: over current alarm, over current alarm value can be set through the menu or communication.
- Detection and display functions:
 - Voltage: detection accuracy: $\pm 1\%$; Display precision: 0.1V; Display number: 4 digits
 - Current: detection accuracy: $\pm 1\%$; Display precision: 0.1A; Display number: 4 digits
 - Temperature: detection accuracy: $\pm 1\%$; Display precision: 0.1; Display number: 4 digits
 - Humidity: detection accuracy: $\pm 1\%$; Display precision: 0.1; Display number: 4 digits
 - Power: Detection accuracy: $\pm 1\%$; Display precision: 1W; Display number: 4 digits
 - Power: detection accuracy: $\pm 1\%$; Display accuracy: 0.1kWh; Display number: 4 digits
- Remote detection and management:
 - Support remote query input voltage, input total current, input power and input KWH value
 - Over-current warning value can be set remotely or entered locally through serial port
- Indicating function:
 - Communication indicator light: alarm indicator light is on.
 - Key Settings:
- Set current alarm limits locally

4. TECHNOLOGICAL ADVANCEMENT

- 485 hot plug AC current voltmeter and socket module are independent of each other, as long as the broken current voltmeter module is replaced, the working state of the equipment can be normally displayed. There is no need to power off the PDU, disassemble, or perform professional maintenance.
- Hot-plug installation, easy maintenance, customers can directly replace the broken current voltmeter module under the condition of normal PDU power supply, replacement without power off. It also facilitates the daily maintenance work.
- High display accuracy, current and voltage display accuracy up to 1%

(0.1A/V)

- Remote access function, customers do not need to go to the computer room to view the electricity information of each intelligent monitoring power distribution unit, can view the electricity information of each distribution unit, as well as the working state of each distribution unit directly in the backstage. Let the customer can easily realize the monitoring of the whole computer room power distribution power supply status and electricity information.

5. Product Usage

A. For the first time to install

- The product adopts RS485 half duplex serial communication port, installation from RS485 bus device or active relay upper computer wiring, as long as the RS485 network cable is inserted into the communication port, and then insert the next extended network cable to the next product input communication port.
- Under normal working conditions, the LCD screen takes turns to display current and voltage, temperature and humidity, power, electric energy and other parameters.
- Please perform the reset operation, device number will be 1.
- The product device number can be directly changed through the upper computer software (optional), alarm threshold parameters set, PDU data collection and quickly find abnormal status of PDU.

B. Faceplate operation instructions

1. After power on, LCD screen display, the indicator light is on for 3 seconds.
2. After the full display, the current can be displayed, others display in turn, also can be turned by key. The display sequence is shown in Table 1.

Table 1:

No.	content	instructions
0	The module addresses	1-247
1	Current value	63.00 A
2	Voltage value	
3	Power value	
4	Electrical energy value	Maximum display 99999kWh
5	Temperature value	One decimal
6	Humidity value	
No.	content	instructions
1	Power consumption status and module address	
2	Voltage, current value	
3	Power value	
4	Electrical energy value	
5	Humidity value Temperature value	

- Long press the SET key for 3 seconds to enter the setting menu. After entering the setting, the setting data will flash and display. Short press UP, DOWN to change the setting value. After setting, short press SET to confirm. After setting, press SET directly to exit, and the setting value will be saved. The Settings are shown in Table 2.

Table 2:

No.	Set the content	instructions
1	Current alarm value	Setting range: 10.0A~63.0A
2	485 Address	1-247

- Power reset, send 2 consecutive specified write command, write command for details in the communication protocol.

6. ANNEX I: COMMUNICATION PROTOCOL

Modbus RTU protocol is adopted for communication, and the data format of a frame is: 1 bit start bit + 8 bit data + 1 bit stop bit

Baud rate 9600 bit/S

1. RTU command format and examples

03H -- Reads single or contiguous registers

Passing the command:

	BYTE	EXAMPLE
Device address	1	01H
Function number	2	03H
Address (High Byte)	3	01H
Address (Low Byte)	4	02H
Number of byte (N) (High Byte)	5	00H
Number of byte (N) (Low Byte)	6	02H
CRC (High Byte)	7	CRC (H)
CRC (Low Byte)	8	CRC (L)

Note: Read the contents of contiguous 2 WORDs starting at address 0102H from table at address 01H.

Returns:

	BYTE	EXAMPLE
Device address	1	01H
Function number	2	03H/04H
Number of bytes (2N)	3	04H
Data 1 (HIGH)	4	00H
Data 1 (Low)	5	01H
Data 2 (HIGH)	6	00H
Data 2 (Low)	7	01H
CRC (High Byte)	8	CRC (H)
CRC (Low Byte)	9	CRC (L)

Note: Returns the contents of 2 consecutive WORDS (shaded) starting at 0102H from the table at 01H.

10H -- write to multiple registers consecutively

Passing the command:

	BYTE	EXAMPLE
Device address	1	01H
Function number	2	10H
Address (High Byte)	3	01H
Address (Low Byte)	4	02H
Number of Byte (N) (High Byte)	5	00H

Number of bytes (N) (Low Byte)	6	02H
Number of bytes (2N)	7	04H
Data 1 (High Byte)	8	00H
Data 1 (Low Byte)	9	01H
Data 2 (High Byte)	10	00H
Data 2 (Low Byte)	11	01H
CRC (High Byte)	12	CRC (H)
CRC (Low Byte)	13	CRC (L)

Note: Writes 2 WORDS (shaded) into two consecutive registers starting at 0102H in table 01H.

Returns:

	BYTE	EXAMPLE
Device address	1	01H
Function number	2	10H
Address (High Byte)	3	01H
Address (Low Byte)	4	01H
Number of bytes (High Byte)	5	00H
Number of bytes (Low Byte)	6	02H
CRC (High Byte)	7	CRC (H)
CRC (Low Byte)	8	CRC (L)

2.Data definition

According to the Modbus protocol, all register data are 1WORD, 16-bit data, and electric energy is represented by 2 registers

3.Format of data

No.	parameter	Data format (decimal)	unit	Data return value (hexadecimal)
1	voltage	220.0	V	0x0898
2	current	9.90	A	0x03DE
3	power	2178	W	0x0882
4	electricity	1088.00	kWh	0x0001 A900

Data conversion formula:

1. Current = [temperature] ÷ 100 = 990 ÷ 100 = 9.90A
2. Power = ([high power value] X 65536 + [low power value]) ÷ 100
= (1 x 65536 + 0 xa900) present 100
= 1088.00 kWh

Note: The above "[]" represents the register reading.

The register no.	Read and write	describe	instructions
0100H	R/W	address	Module address, set range 1 to 247

0101H	R/W	Overcurrent alarm value	
0102H	R	Voltage value	
0103H	R	Current value	
0104H	R	Power value	
0105H	R	High power value	
0106H	R	Low power value	
0107H	R	humidity	
0108H	R	The temperature	
....	The reserved	

Note: R is a read-only register; R/W is a read-write register

Communication Interpretation:

If the load is: voltage 220.8V current 0A, power 2W, energy 4.82kWh, temperature 0 degrees, humidity 0%. The current alarm value is set as 11.0A alarm, and the number of auxiliary modules is 4

Command sent (hexadecimal number) : 01030100000AC4 31 (C431 is CRC check code)

The PDU will return (hexadecimal number) :

01 03 14 0001 006E 08A0 0000 0002 000001E2 0000 0000 two-digit CRC check code

Data:

0001 006E 08A0 0000 0002 000001E2 0000 0000

Address alarm value voltage current power electric energy humidity temperature

The name of the	In addition to	case
address	1	0x0001 =1
Alarm value	100	0 x006e = 110 present 100 = 11.00 A
Voltage	10	0x008A0 = 2208÷10 = 220.8V
Current	100	0 x0000 = 0 100 = 0 a present
Power	1	0x0002 = 2W
Energy	100	X000001e2 = 0 (0 x0000 * 65536 + 0 x01e2) present 100 = (0 + 482) = 4.82
The temperature	10	0x0000 = 0÷10 = 0 degrees
humidity	10	0 x0000 = 0 present 10 = 0%

4.Communication between

The interval between two commands is > 400mS.

5.Power clear zero command

Command: ID 10 0102 0001 02 017C CRC

ID: module address;

CRC: CRC16 check code.

Suggestions for communication timing:

1.Interval between sending and receiving: the host sends the command to the slave, and the next command is sent at an interval of 30~40ms.

2.If the host does not receive the returned data, the host will wait at least 300ms and send the command again.