# SYSTEM USER MSNUAL

## HD1U-4860G-FIFO Embedded Power System


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***High-performance high-reliability power products -48V power communications systems***

***Input:90～290Vac;Output: 42～58Vdc***

## *Application*

Small Exchange

Access Network

Transmission Equip

Satellite Comm Ground Station

Microwave Comm Station

## *Feature*

- The rectifier module adopts active power factor compensation technology, with a power factor value of 0.99
- The normal working range of AC input voltage is as wide as 90-290V。
- The rectifier module adopts full bridge soft switching technology, with a maximum efficiency of over 92%.
- Comprehensive battery management. Equipped with load discharge and battery low voltage protection (LVLD+LVBD) and secondary discharge functions, it can achieve temperature compensation, automatic float charging control, automatic voltage regulation, battery capacity calculation, online battery testing and other functions.
- The rectifier module adopts non-destructive hot swapping technology, which is plug and play, and the replacement time is less than 1 minute.
- Networked design, providing multiple communication interfaces (such as RS485 and dry contacts), flexible networking, capable of limited local and remote monitoring, and unmanned.
- A comprehensive lightning protection design for both AC and DC sides, suitable for areas with frequent thunderstorms.
- Complete fault protection and fault alarm functions.
- Full frontal operation and maintenance, can be installed against the wall, effectively saving space.
- Safe and reliable. The system design fully complies with safety standards EN60950 and GB4943

## Preface

Welcome to use the embedded power supply system developed and produced by our company. The system consists of a distribution unit, monitoring module, and rectifier module. The overall performance is stable and practical, and it can be operated by backend software.

## Statement

1. The specification sheet provides a detailed description of the performance of the embedded power system. Before performing any operations on the power system, users are advised to carefully read this specification sheet and comply with relevant industry safety regulations. Our company is not responsible for product damage caused by improper operation or exceeding the usage conditions specified in this specification.
2. Our company has the right to modify the content of the manual without notifying the customer.

### Safety Instruction

| | |
|---|---|
|  | The AC input line is a high-voltage working line, and the operation process must ensure that the AC input is powered off. Temporary prohibition signs should be added to switches that are not allowed to be used during the operation process. |
|  | The contact points of AC line terminals and other unnecessary exposed areas should be fully insulated. |
|  | Before powering on, it must be grounded。 |
|  | The module has a hot swappable function, but it must be ensured that the module panel indicator lights are all off before inserting the module |
|  | High voltage and AC power operations are strictly prohibited in thunderstorm weather |

# Naming rules

HD1U-4860G-FIFO

S-Standard power system,　48-48V output, 60-60A output, B-rectifier version(option A,B,BH）
H-high effiency(96%),　1U-1U height，　FIFO-Front Input and Front Output

# Index

# Chapter 1 System Instruction

## 1.1 Configuration

Our standard embedded systems mainly include several models and configurations as shown in the table below. (For non-standard products, the actual product shall prevail)

| **Configuration** | | | | | | |
|---|---|---|---|---|---|---|
| Module / sys model | G Monitor | E Monitor | 4830BH Rectifier | 4820BH Rectifier | 4815BH Rectifier | 4810BH Rectifier |
| HD1U-4860G-FIFO | 1 | | 1-2 | Optional | Optional | Optional |

| **Distribution** | | | |
|---|---|---|---|
| Dist / sys mode | Battery | Secondary power off | Main power off |
| HD1U-4860G-FIFO | 1-way output terminals | 4-way output terminals | No |

## 1.2 Technical Performance

Embedded systems are suitable for small programmable switches, access networks, transmission equipment, mobile communication, satellite communication ground stations, microwave communication power supply, and can also be used for power supply of other communication equipment.

### 1.2.1 Basic Working Principle

Under normal circumstances, various parameters of the rectifier module and distribution unit are controlled by the monitoring module and operate according to their predetermined parameters or user commands. If there is a mains power failure, the system will be powered by the battery. As the battery discharges, the voltage at the battery end begins to decrease. When the battery voltage drops below the 46V upper computer (configurable) battery low voltage alarm point, the monitoring module reports an alarm signal and directly turns off the load output, causing the entire machine to not work. When the external power supply is restored, the system returns to normal working state (the above monitoring data is the system default value, which can be reset by the user). If the working environment temperature is ≥ 55 ℃, the power system will need to reduce its power output.

### 1.2.2 Performance

※ **Common performance indicators for embedded systems**

| **Input** | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Min** | **Typical** | Max | **Unit** | **Note** |
| Input Volt Range | 90 | 220 | 280 | Vac | |
| Input Volt Frequency | 45 | 50 | 65 | Hz | |
| PF | 0.98 | | | | |

| **Output** | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Min** | **Typical** | Max | **Unit** | **Note** |

| | | | | | |
|---|---|---|---|---|---|
| Output Volt Range | 42 | 53.5 | 58 | Vdc | |
| Output Curr Range | 0 | | 60 | A | 176～280VAC |
| | 0 | | 30 | A | 90～175VAC |
| Ripple(Peak) | | | 200 | mv | |
| Effiency | ≥95 | 96 | | % | 220Vac |
| | ≥92 | | | % | 110Vac |
| stabilization accuracy | | | ≤±1 | % | |
| Load regulation | | | ≤±1 | % | |
| Source Regulation | | | ≤±1 | % | |

| **Insulation level** | | |
|---|---|---|
| **Parameter** | **Standard requirements** | **Note** |
| Input-Output | 3000Vdc/10mA//1min | |
| I(nput--Shell | 2500Vdc/10mA//1min | |
| Output-Shell | 700Vdc/10mA//1min | |
| Insulation resistance | Under normal atmospheric pressure, with a relative humidity of 90% and a test voltage of 500V DC, the insulation resistance of the power supply input to output, input to ground, and output to ground shall not be less than 10M Ω.Leakage Current is ≤3.5 mA | |

| **Enviroment** | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Min** | **Typical** | Max | **Unit** | **Note** |
| Working Temp | -25 | | 55 | °C | Can operate normally under full load conditions at an ambient temperature of 55 ℃, with a linear reduction of 2.0%/℃ from+55 to+65 ℃. Note 1 |
| Storage Temp | -40 | | 80 | °C | |
| Humidity | 10 | | 90 | % | Relative humidity, non Condensing |
| Air Pressure | 70 | | 106 | KPa | |
| Altitude | 0 | | 3000 | m | |
| Cooling Function | Forced air cooling, with forward air and rear air outlet. The fan is located in the front panel and has temperature control and speed regulation function. | | | | |

| **Protection** | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | Unit | Yes/ No | **Min** | **Typical** | Max | Recovery type |
| In Over-Volt Alarm | Vac | Yes | 285 | 295 | 305 | Recovery difference of 10 ± 5V |
| In under-Volt Alarm | Vac | Yes | 85 | 90 | 95 | |
| In Over-Volt Protection | Vac | Yes | 300 | | 315 | Recovery difference of 10±5V |
| In under-Volt Prot | Vac | Yes | 75 | | 85 | |

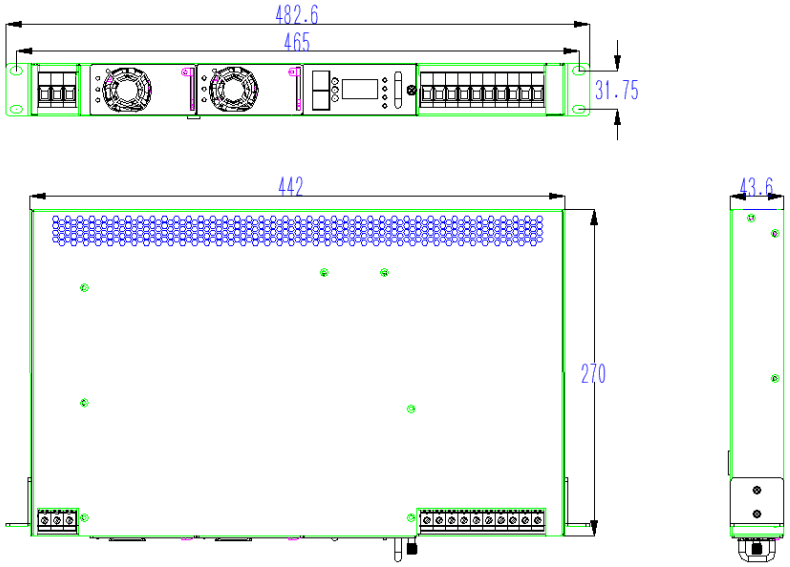
| | | | | | | |
|---|---|---|---|---|---|---|
| Out Over-Volt Alarm | V | Yes | 58 | | 59 | Recovery difference of 1V |
| Out Under-Volt Alarm | V | Yes | 46.5 | 47 | 47.5 | Recovery difference of 1V |
| Out over-Volt Prot | V | Yes | 59 | | 60 | Can not auto recovery |
| Batt shunt prot | V | Yes | 42.5 | 43 | 43.5 | Recovery difference of 2.5-3V |
| Envi Hi Temp Alarm | ℃ | Yes | 45 | 50 | 55 | Recovery difference of 3℃ |
| Envi Low Temp Alarm | ℃ | Yes | -15 | -10 | -5 | |
| Short Protection | A | Yes | Can be short circuited for a long time; After detecting a short circuit and burping for 5 minutes, if the module output still has a short circuit, turn off the machine | | | |

※ **Different performance indicators for embedded systems**

| **Input and Output** | | | | |
|---|---|---|---|---|
| Type / sys mode | Input Max Current | Output current | | |
| | | 170～290VAC | 151～175VAC | 90～150VAC |
| HD1U-4860G-FIFO | 20A | 60A | 22A | 22A |

| **Mechanical** | | | | | |
|---|---|---|---|---|---|
| Type / sys mode | Weight（KG） | | Dimension(mm) | | |
| | With module | Without Module | W | D | H |
| HD1U-4860G-FIFO | ≤8 | ≤4 | 482.6 | 270 | 43.6 |

Dimension(mm)

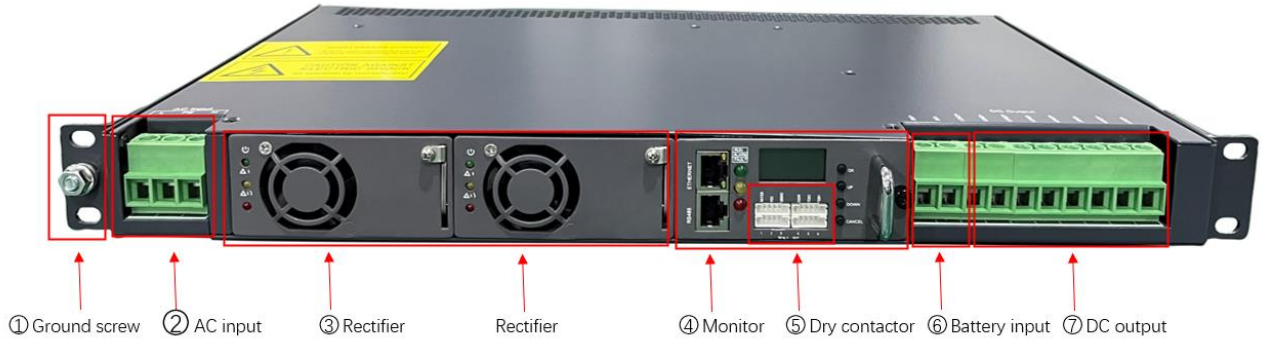


## 1.3 System Installation

When the embedded system is packaged and transported, the monitoring module and all rectifier modules have been installed on the system main box (except for special requirements).

The installation dimensions of the system are all standard 19 inches. It is recommended that two people cooperate during installation, one person supports the frame, and the other person uses tools such as screwdrivers to fix it to the customer's cabinet using the holes of the frame hanging ears. The screws are M6 * 12 pan head screws.

**HD1U-4860G-FIFO** Main box layout diagram（Front View）




### 1.3.1 Electric connection between the box and outside

#### 1.3.1.1 Instruction

| conn / Sys Mode | AC Input | Battery and load output |
|---|---|---|
| **HD1U-4860G-FIFO** |  |  LAOD+<br>LOAD- Common Neg terminal<br>BAT+ Battery positive terminal<br>BAT- Battery positive terminal<br>Cable pressure fork terminal, connect as indicated, and tighten with a cross screwdriver.<br>Above cable recommended for 4 square cable connection |

**Notice ：**

**1、The AC input line is a high-voltage working line, and the operation process must ensure that the AC input is powered off. Temporary prohibition signs should be added to switches that are not allowed to be used during the operation process.**

**2、The contact points of AC line terminals and other unnecessary exposed areas**

**should be fully insulated.**

**3、Before powering on, it must be grounded.**

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### 1.3.1.2 Communication Connection Description

The communication line interface RS485 embedded in the system is located on the front panel of the monitoring module, and RS485 is the communication port used for communication with the upper computer.

*** RS485 Communication：**

A、Connect one end of the communication line to RS485 on the front panel of the monitoring module.

B、Connect the other end of the communication line to the RS485 of the upper computer, and the positive and negative terminals of RS485 correspond to the positive and negative terminals of RS485, respectively.

### 1.3.2 Installation inspection

(1) Installation inspection content: Stability inspection of frame installation, stability inspection of each assembly unit.

(2) Communication introduction and power distribution inspection: whether the chromatography of AC wires is standardized, whether the original wiring of the rack is loose, and whether the safety signs of the AC power distribution part are complete. Refer to the design data to check the communication wiring and wiring situation.

(3) DC output and battery connection points, numbering, polarity check of wire sequence, stability check of cable connection points, correctness and reliability check of busbar connection, and re inspection of battery connection polarity and sequence.

(4) All switches are placed in the off position.

## 1.4 Installation instructions for monitoring module and rectification module


**Schematic diagram of module installation position (side)**


**Installation diagram of monitoring module (front)**


**Installation diagram of rectifier module (front)**

The panels of the monitoring module and rectifier module both have handles. When inserting them into the main unit box, one hand should hold the handle tightly, the other hand should support the components, and slowly push them into the corresponding slots until the connection terminals of the rear panel of the components are inserted into the corresponding sockets of the main unit box system motherboard. Finally, tighten the fixing screws on the panel to the main unit box, and the installation is completed; When removing each component from the main unit box, first loosen the fixing screws on the panel, grip the handle, and slowly remove the component from the corresponding slot. Except for the modules embedded in the 3U-4890 system which are installed vertically, the rest are installed horizontally.

**Note: The module has a hot swappable function, but before inserting the module, it is necessary to ensure that all the indicator lights on the module panel are off.**

# Chapter 2　Monitor Module

## 2.1 Apperance

Monitor G

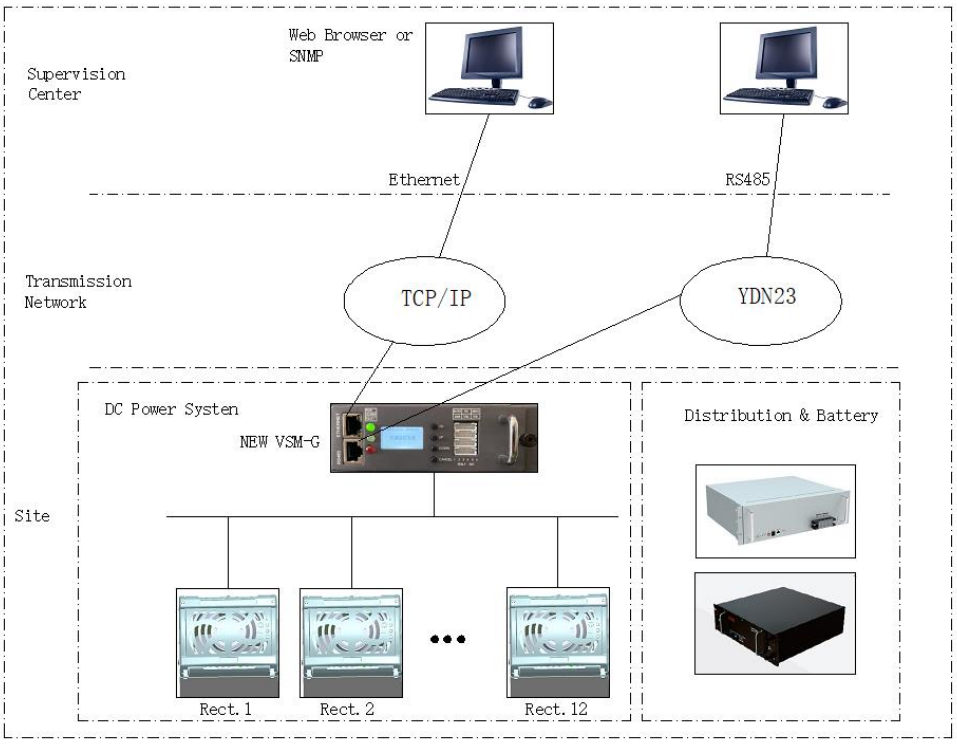
GMonitor Apperance：

Dimension：213.4mm ×84mm×41.6mm

Weight：≤0.6Kg

## 2.2　System composition

The G monitoring module, rectifier module, distribution box (or distribution cabinet) and other equipment form a communication power monitoring system. The system monitoring solution is shown in the figure:




## 2.3. Function

2.3.1 Communication function between monitoring unit and host computer

Communication with the host computer is an important feature of the G monitoring module. The

monitoring module provides an RS485 interface to the host computer, with the main functions of:

（1）Send real-time simulation data of the monitoring unit to the host computer；

（2）Send real-time switch data of the monitoring unit to the host computer；

（3）Accept commands such as setting system parameters on the host computer and turning on/off the rectifier module；

（4）Accept control commands sent by the host computer；

（5）Send an alarm status to the upper computer.

The device and monitoring module have a host-slave relationship, and all reading, setting, and control processes should be initiated by the host computer. The monitoring module is always in a slave state, and without correct commands from the host computer, the monitoring module cannot actively report data to the host computer.

The analog data sent by the monitoring module to the host computer includes AC voltage, busbar voltage, battery current, load current, battery temperature, ambient temperature, ambient humidity, and module fan speed.

The switch signals sent by the monitoring module to the host computer include: module failure, DC undervoltage, DC overvoltage, battery power-off, module on/off, battery fuse status, load fuse status, battery float charging status, and backup sensor status.

The alarm status sent by the monitoring module to the upper computer includes AC overvoltage, AC undervoltage, AC phase loss, AC air switch, module fault, fan fault, module current limiting, DC undervoltage, DC overvoltage, battery power-off, load fuse, and battery fuse status.

The setting parameters sent by the host computer to the monitoring module include: average charging voltage, float charging voltage, DC output overvoltage alarm point, load current too high alarm point, battery current too high alarm point, battery undervoltage alarm point, battery temperature too low alarm point, battery temperature too high alarm point, environmental temperature too high alarm point, environmental temperature too low alarm point, primary power off voltage value, primary power off recovery value, battery power off alarm point, battery capacity, battery current limiting coefficient, temperature compensation coefficient, average charging to float charging current coefficient, float charging to average charging current coefficient, periodic average charging interval time, continuous average charging time, current limiting point current, AC voltage too high alarm point, AC voltage too low alarm point, AC power off value.

The control commands sent by the host computer to the monitoring module include: module on/off, temperature compensation on/off, backup relay on/off, and manual equalization.

### 2.3.2 Control function

The monitoring module can provide control signals based on certain monitored values or commands from the upper computer.

（1）Adjust output voltage: Adjust the average float charging voltage through backend software, and determine the system output voltage based on the system's average float charging status.

（2）Batt Management

Battery low voltage: When the output voltage is below the set battery low voltage, the system will output an alarm in the background and dry contact output an alarm.

Battery discharge: When the output voltage of the system is lower than the set battery discharge

voltage in the battery discharge state, the DC contactor of the battery will disconnect, close all loads, and disconnect the battery from the system. The whole machine will not work and needs to be powered on again to start.

Battery float charging management: When the charging current of the battery is greater than the set maximum charging current, the system performs constant current equalization charging on the battery. When the constant current equalization reaches the equalization charging voltage, the system performs constant voltage equalization charging. When the constant voltage equalization charging current is below the equalization to float charging current, the current floats. When the float charging current is greater than the equalization to float charging current, the system automatically switches to equalization charging when the equalization and float charging continue for a set time, If the constant pressure equalization time exceeds the set equalization duration, it will automatically switch to float charging, while manual equalization will switch to equalization charging.

Temperature compensation: When the battery temperature sensor is connected and temperature compensation is turned on, if the battery temperature is higher than 25 ℃, temperature compensation will be applied. If it is lower than 25 ℃, negative temperature compensation will be applied. The maximum compensation value will not exceed 2V, and the compensation value is equal to temperature × Coefficient.

2.3.3 Inspection function

The monitoring module can inspect the rectifier module and DC output.

（1）The monitoring module can monitor whether the rectifier module is turned on/off, as well as the module's output voltage, current, fan speed, and fault status.

（2）DC output - monitors the bus voltage, load current, battery current, temperature, and fuse status.

2.3.4 Remote control

Character table

| Parameter | Description |
|---|---|
| Rectifier switch | Module controls the rectifier module to shut down according to the background power down command, and the module works automatically after power on |
| Rectifier Boost charge and float charge | Monitor shall control the charging and floating of the module according to the background command or battery management conditions |
| Rectifier Voltage Adjust | Monitor controls the module to adjust the voltage according to the background command or battery management conditions |
| Rectifier Current Limitation | Monitor controls the current limit of the module according to the battery management conditions |
| Six channel alarm output (dry node output) | They are system emergency alarm (AC power failure alarm, rectifier module alarm, LVD disengagement alarm), system non emergency alarm (AC overvoltage and undervoltage alarm, DC overvoltage and undervoltage alarm, 4-way load fusing alarm, 1-way battery fusing alarm, battery undervoltage alarm), high and low temperature alarm, door prohibition alarm, smoke alarm and water prohibition alarm. Among them, the system emergency alarm and non emergency alarm can be set |

Remote Communication Table

| Parameter | Description |
|---|---|
| Without AC Input | Alarm when the mains voltage is less than 60V and recover when it is greater than 70V |
| AC Input Volt Over | 1) If it is greater than the AC overvoltage alarm point, the default alarm point is 295v;<br>2) Alarm recovery conditions: for 10 consecutive seconds, the listed electric voltage is less than overvoltage alarm point - 10V; Or continuously for 10 ± 3 minutes with the listed electric voltage ＜ overvoltage alarm point - 3V<br>3) The overvoltage alarm point can be set in the background, and the mains overvoltage alarm can be shielded without mains power |
| AC Input Volt Under | 1) It is less than AC undervoltage alarm point, and the default alarm point is 90V.<br>2) Alarm recovery conditions: for 10 seconds, the listed electric voltage > undervoltage alarm point + 10V; Or continuously for 10 ± 3 minutes with the listed electric voltage > undervoltage alarm point + 3V<br>3) The undervoltage alarm point can be set in the background, and the undervoltage alarm of mains power is shielded without time |
| DC output Volt Over | 1) Alarm point setting, setting range (floating charge voltage + 1) - 60V, alarm return difference 1V;<br>2) Default value: 59V, DC overvoltage alarm when bus voltage > 59V, overvoltage alarm disappears when bus voltage ≤ 58V; |
| DC output Volt Under | 1) The alarm point can be set, the lower limit voltage of the setting range is - (floating charge voltage - 2) V, and the alarm return difference is 1V;<br>2) Default value: 47v, DC undervoltage alarm when the bus voltage is less than 47v, and the undervoltage alarm disappears when the bus voltage is ≥ 48V; |
| Over Temp Alarm | If it is greater than the over temperature alarm point, the alarm recovery period is 3 ℃, and the default alarm point is 50 ℃ |
| Low Temp Alarm | Less than the low temperature alarm point, the return difference of alarm recovery is 3 ℃, and the default alarm point is - 10 ℃ |
| n#rectifier Fault | It indicates that n# rectifier module has at least one fault of input overvoltage and undervoltage, over temperature and output overvoltage |
| Battery Fuse break | when the battery circuit breaker is disconnected |
| Load Fuse break | when the load is air disconnected (L4 is connected to the fan, and its air disconnection does not generate an alarm) |
| Door | 1 Channel |
| Fan Alarm | fan not working, |
| Smoke | |

2.3.5 **Others**

### 2.5.1 LED

| Name | Color | Status | Description |
|---|---|---|---|
| Running | Green | Light or not | Fault or without input |
| | | Flink | OK |
| Alarming | Yellow | Not light | Without alarm |
| | | Light | Alarm |
| Fault | Red | Not light | Without Fault |
| | | Light | Fault |


### 2.5.2 Connector Definition

#### 2.5.2.1 RJ45

| Name | Definition | Description |
|---|---|---|
| Ethernet | | |
| RS485 | PIN2 | A+ |
| | PIN3 | B- |


#### 2.5.2.2 4*6P Connector

| PIN1 | PIN2 | PIN3 | PIN4 | PIN5 | PIN6 |
|---|---|---|---|---|---|
| WATER | | VCC | | SMOKE | |
| DOOR | | BAT-TEM2 | | LJ-TEM1 | |
| DO01 | | DO02 | | DO03 | |
| DO04 | | DO05 | | DO06 | |

2.3.6 **Menu**

#### 2.3.6.1 LCD Operation

(1) VSM-G LCD Key：

There are only four operation keys "up, down, OK and cancel" on the front panel to carry out menus at all levels, function conversion, parameter setting, etc.

a. Up - Flip up key: flip up the menu, change parameter setting, value increase and other operations;

b. OK - Pan key: transfer to the same level and level menus;

c. Down - scroll down key: flip down the menu to change parameter setting, value reduction and other operations;

d. Cancel - cancel key: Cancel and return to the superior menu.

Move the time scale in the numerical parameter editing status, and long press to cancel the parameter modification.

(2) Main Menu：

a. Main page - display the basic information of the system immediately after the system is connected to the battery or rectifier module;

b. No matter what operation or display state, return to the main interface after stagnating for 30s.

(3)Hierarchy of monitoring menu structure: hierarchical, multi-level, step-by-step and cyclic tree structure (see menu structure for details).

**2.3.6.2 Menu Structure**

| Main Menu | First Level |
|---|---|
| Standby<br>System status,<br>Exchange of information,<br>Battery information,<br>Tempe information | AC distribution |
| | DC distribution |
| | Rectifier module |
| | Alarm setting |
| | Shunt metering |
| | system configuration |
| | Event record |
| | Equipment information |

**2.3.6.3** AC distribution

| First | Second | Third |
|---|---|---|
| AC distribution | Status | A Phase Volt |
| | | A Phase Curr |
| | | B Phase Volt |
| | | B Phase Curr |
| | | C Phase Volt |
| | | C Phase Curr |
| | | Frequency |
| | | Power Factor |
| | | Active power |
| | | Active kWh |
| | Alarm | A Phase Lost |
| | | A Phase Volt Over |
| | | A Phase Volt Under |
| | | A Phase Curr Over |
| | | B Phase Lost |
| | | B phase Volt Over |
| | | B Phase Volt Under |
| | | B Phase Curr Over |
| | | C Phase Lost |
| | | C Phase Volt Over |
| | | C Phase Volt Under |
| | | C Phase Curr Over |
| | | Frequency Over |
| | | Frequency Under |

| | | |
|---|---|---|
| | Set | AC volt over alarm |
| | | AC volt under alarm |
| | | Phase lost alram |
| | | AC curr over alarm |
| | | Frequency Over alarm |
| | | Frequency Under alram |
| | Configuration | CT |
| | | Type |
| | calibration | A Phase Volt |
| | | A Phase Curr |
| | | B Phase Volt |
| | | B Phase Curr |
| | | C Phase Volt |
| | | C Phase Curr |

#### 2.3.6.3 DC distribution

| First | Second | Third | Fourth |
|---|---|---|---|
| DC distribution | Status | Charge discharge status | |
| | | Bus Volt | |
| | | Load Volt | |
| | | Batt Curr 1 | |
| | | Batt Curr 2 | |
| | | Rectifier total curr | |
| | | Load total curr | |
| | | Batt Temp | |
| | | Circumstance Temp | |
| | | Circumstance Humidity | |
| | | Extending Temp | |
| | | Batt Remain Capacity | |
| | | Load Curr 1 | |
| | | Load Curr 2 | |
| | | Load Curr 3 | |
| | | Load Curr 4 | |
| | Set | Charge Setting | Float Volt |
| | | | Boost Volt |
| | | | System lowest Volt |
| | | | Batt Capacity |
| | | | Boost charge to float charge coefficient |
| | | | float charge to Boost charge coefficient |
| | | | Batt Charge Curr limit value |

| | | | |
|---|---|---|---|
| | | Alarm threshold Value | Sys Curr limit value |
| | | | LoadCurr over value |
| | | | Batt Curr over value |
| | | | DC volt over value |
| | | | Batt volt under value |
| | | LVD set | LVD1 start |
| | | | Power down delay Load 1 |
| | | | Power off Load 1 |
| | | | Power recover Load 1 |
| | | | Power down delay Load 2 |
| | | | Power off Load 2 |
| | | | Power recover Load 2 |
| | | | Power down delay Load 3 |
| | | | Power off Load 3 |
| | | | Power recover Load 3 |
| | | | Power down delay Load 4 |
| | | | Power off Load 4 |
| | | | Power recover Load 4 |
| | | | LVD2 start |
| | | | LVD2 break value |
| | | | LVD2 recover value |
| | | Temp&Humidity | Batt temp over alarm |
| | | | Batt temp low alarm |
| | | | Circumstance Temp Over |
| | | | Circumstance Temp under |
| | | | Circumstance Humi Over |
| | | | Circumstance Humi low |
| | | Temp Compensation | Start |
| | | | coefficient |
| | | Periodic Boost Charge | Start |
| | | | Interval time |
| | | | Duration time |
| | | Manual Boost charge | time |
| | | | Charge time |
| | | Batt quick charge | Start |
| | | | quick charge volt value |
| | | | quick charge time limit |
| | | Batt test | Start |
| | | | Batt test starting voltage |
| | | | Batt test ending voltage |
| | | | Batt test Duration time |

| | | | |
|---|---|---|---|
| | | | Test Result |
| | Alarm | DC Volt Over | |
| | | DC Volt Under | |
| | | Primary Power down | |
| | | Secondary Power down | |
| | | Load Fuse | |
| | | Batt Fuse | |
| | | Batt Curr over | |
| | | Load Curr over limit | |
| | | Batt Temp Over | |
| | | Batt Temp Under | |
| | | Lighting | |
| | | Smoke | |
| | | Water immersing | |
| | | Door | |
| | | Air Condition | |
| | | Impact | |
| | | Circumstance Temp Over | |
| | | Circumstance Temp Under | |
| | | Power Down Load 1 | |
| | | Power Down Load 2 | |
| | | Power Down Load 3 | |
| | | Power Down Load 4 | |
| | Config | Number of Batt Set | |
| | | Type of Batt Contactor | |
| | | Batt Shunt Current | |
| | | Batt Shunt Volt | |
| | | Number of Load | |
| | | Type of Load Contactor | |
| | | Load Shunt Curren | |
| | | Load Shunt Volt | |
| | Calibration | Bus Volt | |
| | | Load Volt | |
| | | Batt curr 1 | |
| | | Batt curr 2 | |
| | | Load total Curr | |
| | | Load Curr 1 | |
| | | Load Curr 2 | |
| | | Load Curr 3 | |
| | | Load Curr 4 | |

#### 2.3.6.4 Rectifier

| First | Second | Third |
|---|---|---|
| **Rectifier** | Status | |
| | Curr/Volt Limit | Over Curr Limit value |
| | | Over Volt limit value |
| | Energy saving settings | Energy saving start-up |
| | | Module sleep coefficient |
| | Number of rectifier | Rated Number of rectifier |

#### 2.3.6.5 Alarm Setting

| First | Second | Third |
|---|---|---|
| Alarm Setting | Relay status | DO1 Output status |
| | | DO2 Output status |
| | | DO3 Output status |
| | | DO4 Output status |
| | | DO5 Output status |
| | | DO6 Output status |
| | Relay setting | DO1 Alarm Type |
| | | DO1 Output Type |
| | | DO2 Alarm Type |
| | | DO2 Output Type |
| | | DO3 Alarm Type |
| | | DO3 Output Type |
| | | DO4 Alarm Type |
| | | DO4 Output Type |
| | | DO5 Alarm Type |
| | | DO5 Output Type |
| | | DO6 Alarm Type |
| | | DO6 Output Type |
| | Alarm Level | AC over volt alarm |
| | | AC power off alarm |
| | | AC frequency |
| | | AC Over Curr |
| | | AC MCB |
| | | Rectifier |
| | | Rectifier Over Volt |
| | | Batt Under Volt |
| | | LVD1 Alarm |
| | | LVD2 Alarm |
| | | Batt Over Curr |
| | | Load Over Curr |

| | | |
|---|---|---|
| | DI set | DI1(Door) |
| | | DI2(Smoke) |
| | | DI3(Lighting) |
| | | DI4(Water immersion) |
| | | DI5(Air condition) |
| | | DI6(Impact) |

**2.3.6.6 Shunt Metering**

| First | Second |
|---|---|
| Shunt metering | Total Power consumption |
| | Monthly power consumption |
| | Daily power consumption |
| | Clean |

**2.3.6.7** system configuration

| First | Second | Third |
|---|---|---|
| system configuration | Serial port settings | Equipment Address |
| | | RS485 Baud rate |
| | network configuration | Local IP address |
| | | Subnet mask |
| | | Default gateway |
| | | Port No |
| | Sys Display | Buzzer switch |
| | | LCD Language |
| | | LCD Backlight delay |
| | Sys time | |
| | Code set | |

**2.3.6.8 Event record**

| First | Second | Third |
|---|---|---|
| Event record | View records | Record 1 |
| | | …… |
| | Clean Records | |

**2.3.6.8 Equipment information**

| First | Second |
|---|---|
| Equipment information | |

## 2.4. Installation

When the monitoring module is applied to the embedded power system, its installation is very simple. Push the monitoring module along the guide slot of the corresponding cabin of the main box of the power system, insert the pin of the monitoring module into the socket of the system motherboard, and tighten the screw on the front panel of the monitoring module to fix the monitoring module on the

main box of the system, so as to complete the mechanical fixation and electrical connection of the monitoring module.

## **2.5.** Maintenance

(1) Cause analysis and maintenance of 485 communication interruption

① Check whether the 485 communication line is connected correctly and firmly.

② Detect the communication parameters (communication address and baud rate) between the monitoring unit and the host computer.

(2) If the reported data is incorrect (including analog quantity and switching quantity) and remains unchanged, or the control state is inconsistent with the issued command, or the parameter setting is inconsistent with the actual implementation, the following reasons may be caused:

※ the input signal is incorrect; ※ Input circuit is damaged; ※ Rectifier module failure.

Maintenance: contact the manufacturer for repair or replacement.

# Chapter 3 Rectifier

## 3.1 Apperance

※**C**urrently, our company uses rectifier modules in embedded systems, including 4830B, 4820B, 4815B, 4810B,

The Apperance of Rectifier is refe of right pic
Dimmension： 220mm*87mm*41.6mm
Weight： ≤1.2Kg

## 3.2 Technical specifications

### 3.2.1 Characters

| **Input and output** | | | | |
|---|---|---|---|---|
| Type / Sys Mode | Input range | Input max current | DC Output rated current | Output max power |
| 4810B | 90-280Vac | 3.7A | 10A | 600W |
| 4815B | 90-280Vac | 5.6A | 15A | 800W |
| 4820B | 90-280Vac | 7.5A | 20A | 1200W |
| 4830B | 90-280Vac | 10A | 30A | 1800W |

### 3.2.2 Protection function

| Items | Unit | Yes/No | Min | Typical | Max | Recovery type |
|---|---|---|---|---|---|---|
| In Over volt prot | Vac | Yes | 285 | 295 | | Auto recovery |
| In Over-volt prot Rey | Vac | Yes | 280 | | | Less than 5V |
| In under-Volt Protection | Vac | Yes | | | 85 | Auto recovery |
| In under-Volt Prot recov point | Vac | Yes | | | 90 | Less than 5V |
| Out over volt protection point | Vdc | Yes | 58.5 | 59 | 61.5 | Locked |
| Out current liminting poiot | A | Yes | Ia *110 % | Ia *115% | Ia *120 % | Auto recovery |
| short | A | Yes | Can be short circuited for a long time; After detecting a short circuit, hiccups work and can self recovery | | | |
| Over temp prot | | Yes | can automatically recover at an ambient temperature of 65 ℃ | | | |

| | | | |
|---|---|---|---|
| Fan Fault prot | | Yes | When all fans fail, the module reports a fan failure alarm and directly turns off the output; |

## 3.3 Requirements for the working environment

(1)Working temp：-33℃～+55℃（Can operate normally under full load conditions at an ambient temperature of 55 ℃+55~+65 ℃ Linear Derating 2.0%/℃）

(2)Humidity：5～95%（Non condensing）

(3)Storage temp：-40℃～+70℃

(4)Altitude：0～3000m

(5)Air pressure：70～106KPa

(6)Cooling function：Air forced cooling by fan

## 3.4 Instruction and maintenance

### 3.4.1 Panel


1. Fixing Screw 2. Fan 3. RUN running led(green)
4. ALARM led(yellow) 5. FAULT led(red)

### 3.4.2 Alarm signal indication

**3.4.2.1** When the power module is running normally, the green light will be on; Otherwise, it will be extinguished. (Green light goes off when there is a power failure or no output from the module)

**3.4.2.2** When the power module is running normally, the yellow light goes out; When the power module experiences abnormal temperature warning, automatic derating, current limiting, fan warning, and yellow light on.

**3.4.2.3** When the power module is running normally, the red light goes off; When the power module malfunctions and there is no output due to overvoltage shutdown, fan failure, overheating shutdown, remote shutdown, or other internal reasons, the red light will be on.

| LED | | | | |
|---|---|---|---|---|
| LED Status | Module alarm status | | | |
| | Color | Normal; | Abnormal | abnormal cause |
| Run | Green | Lighting | light off | light off when a red light is on<br>When the yellow light is on, see the table below |
| Protection | yellow | light off | Lighting | When the power module has recoverable protection and the module is activated, it will always light up. Otherwise, the yellow light will flash when communication is interrupted;<br>OTP (when the ambient temperature exceeds 65 ℃ and the module shuts down due to overheating), input overvoltage and undervoltage are effective, and alarm is effective during overcurrent.<br>Hibernation shutdown (When hibernation shutdown occurs, the module only lights up the protection indicator light and does not report an alarm) |
| Fault | Red | light off | Lighting | There is an irreparable fault inside the module, and the module FAIL is always on when it is valid. When PS enable is normal, the FAIL is valid when Vo-OV, fan failure (single or dual fan failure), output short circuit, or no output occurs. |

### 3.4.3 Precautions for the use and maintenance of rectifier modules

(1) If the red light (FAIL) on the front panel of the rectifier module remains on during normal operation, it indicates that the rectifier module has malfunctioned and needs to be removed from the system for repair. If the rectifier module is damaged, please contact the manufacturer. Without permission, non professionals from our factory are prohibited from disassembling the rectifier module.

(2) Allow for hot swapping

a. When the entire module needs to be removed from operation, loosen the fastening screws, hold the handle, and pull it out without turning off the AC power. This can effectively ensure that a power system composed of multiple modules does not need to be powered off when a rectifier module needs to be removed for maintenance, ensuring the normal operation of the power system.

b. When connecting the electrical interface of the rectifier module to the power system, it is necessary to ensure that the indicator light on the front panel of the rectifier module is off before inserting the rectifier module.

# Chapter 4　Safety precautions for use

**1、Unpacking**

Check if the equipment has been damaged during transportation. Keep the packaging materials until all module units of the power supply equipment have been registered and inspected.

**2、General rule**

● The air passage of the unit should not be obstructed。

● The distance between any conductive part of the power supply equipment and the metal components must comply with relevant safety standards.

**3、Security protection measures**

● Once the safety protection of the equipment is damaged, the equipment must stop working and refer to relevant maintenance regulations for handling.

● When the power supply equipment switches from a cold environment to a warm environment, condensation may cause dangerous problems, so grounding requirements must be strictly enforced. Qualified personnel are required to connect the equipment to the power supply.

● The power supply must be shut down for four minutes to allow sufficient discharge time for the capacitor before maintenance can be carried out on the power equipment.

● Do not operate in environments with volatile gases or flammable substances.

● Under no circumstances should the outer cover be removed or internal parts be touched.

● For safety reasons, do not perform internal maintenance or parts replacement separately.

In any case, such as operation, cleaning, or maintenance, please comply with the safety regulations specified above. If any violation causes safety concerns beyond the original design or manufacturing, our company will not be responsible.

**4、Notice**

● The power supply should be used under the environmental conditions specified in the manual；

● When using, the power supply should maintain good ventilation and heat dissipation; If smoke or unpleasant odor is found during startup or use, the power should be immediately turned off.

# Chapter 5 Packaging, Transportation, and Storage

**1、Packing：**

The packaging box contains the product name, model, manufacturer identification, inspection certificate from the manufacturer's quality department, manufacturing date, etc; There is a product specification book and an attachment list inside the packaging box.

2、**Transportation:**

Suitable for transportation by car, ship, and plane. During transportation, it should be covered with canopy, sun protection, and civilized loading and unloading.

**3、Storage：**

When the product is not in use, it should be placed in the packaging box. The warehouse environment temperature is -40~+80 ℃, and the relative humidity is 10%~90%. The warehouse should not contain harmful gases, flammable, explosive products, or corrosive chemical products, and there should be no strong mechanical vibration, impact, or strong

magnetic field effects. The packaging box should be placed at least 20cm above the ground and at least 50cm away from walls, heat sources, and window type air inlets. The storage period under these specified conditions is generally 2 years, and after more than two years, it should be re inspected.

# Chapter 6 Warranty

**1、Warranty period**

During the warranty period of one year, any natural damage caused by normal use of this product will be repaired free of charge by our company. However, any of the following situations are not covered by the warranty:：

- Damage caused by unauthorized repair without the permission of our company.
- Any addition or modification.
- Incorrect operation or use.
- Abnormal environmental conditions exceeding specifications, resulting in damage.
- Intentional destruction caused by human factors.
- Damage caused by uncontrollable natural disasters.

**2、Maintenance scope**

If the power supply system operates abnormally due to material and manufacturing technology errors during the warranty period, our company will provide free repair or replacement. Maintenance services will include various labor services and any necessary adjustments or replacement of parts.

# Chapter 7 Relevant Standards Referenced

- GB2423.1-89 Basic Test Procedures for Electrical and Electronic Products, Standard Ad.
- GB2423.2-89 Basic Test Procedures for Electrical and Electronic Products, Test Bd.
- GB3873-83 General Technical Conditions for Packaging of Communication Equipment Products.
- Detailed rules for quality certification and inspection of high-frequency switching power supply equipment for communication.
- YD/T731-2008 high-frequency switching rectifier for communication.
- XT-005-95 General Technical Requirements for Power Supply Systems of Communication Bureaus (Stations) (Provisional Regulations).

# Chapter 8 System working Principle Diagram