

# VT-42IPS-48200A

## (Version: VT-42.1)

### High performance and high reliability power supply products

**Embedded power supply system**  
Input: 90 ~ 290Vac; Output: -42.5 to -58VDC



#### **Application**

Small SPC exchange

Access network

Transmission equipment

The mobile communication

Satellite communication ground station

Microwave communication power supply

#### **Characteristics of the preface**






- ◆ The embedded power supply system adopts active power factor compensation technology with power factor > 0.98
- ◆ Ac input voltage normal operating range of 90 ~ 290Vac
- ◆ The operating temperature ranges from -25 ° C to +55 ° C
- ◆ Adopting soft switching technology, system efficiency ≥91%
- ◆ Perfect battery management, including charge and discharge management, battery temperature compensation, battery capacity test, battery anti-reverse connection protection, low voltage protection and other functions, prolong the battery life
- ◆ The system adopts non-damage hot swap technology for easy maintenance
- ◆ Input overvoltage and under voltage protection
- ◆ Output overvoltage protection
- ◆ Output overcurrent protection
- ◆ Output short circuit protection
- ◆ Automatic current equalization technology, parallel output can be realized
- ◆ Flush mounting

Welcome to use **VT-42IPS-48200A** embedded power system developed and produced by HOHUI Tech. VT-42IPS-48200A is composed of motor frame, monitoring module and rectifier module. The power supply system has DC power distribution function, power supply monitoring to provide support for external signal input, communication conversion function and AC and DC detection, contactor control and other functions, the machine stable performance, practical, can be background software operating system.

## The statement

1. The specifications describe the performance of the VT-42IPS-48200A embedded power system in detail. Before performing operations on the power system, please read the specifications carefully and comply with the safety regulations of related industries. The company is not responsible for any damage caused by improper operation or beyond the operating conditions specified in this specification.
2. We have the right to change the specifications without notice to the customer.

## Safety regulations

 High pressure	<p>The ac lead-in line is a high-voltage working line. During the operation, it is necessary to ensure that the AC input power is cut off. During the operation, the switch that is not allowed to be used should be marked with a temporary ban label.</p>
 Pay attention to	<p>The ac line terminal contacts and other unnecessary exposed places should be fully insulated.</p>
 Pay attention to	<p>Ground the device before powering on it.</p>
 Pay attention to	<p>The module is hot-swappable. Ensure that all indicators on the panel of the module are off before inserting the module</p>
 Pay attention to	<p>Do not perform high-voltage or AC operations on a thunderstorm day</p>

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## 1. System Overview

### 1.1. VT-42IPS-48200A System configuration

The VT-42IPS-48200A consists of a subrack power distribution module, a maximum of four rectifier modules, and a monitoring module. For details about the optional modules, see the following table:

Configuration	Rectifier module	Monitoring module	The power distribution	Note
The standard configuration	VT-42REC-4850A	VT-42MM-a (with Ethernet interface)	Ac power distribution: single-phase input, total power AC circuit breaker (80A/2P); Dc power distribution: battery circuit breaker 100A/1P×2; Single power-off: 32A x 2, 63 x 2, 16 x 6 (the circuit breaker size is optional). Secondary power-off: 16A x 2, 10A x 2 (the circuit breaker size is optional).	For details, see the module specifications

### 1.2. Working principle of VT-42IPS-48200A

The AC power supply is controlled by the AC-INPUT air switch and then enters the rectifier module through lightning protection and filtering. The AC-INPUT protects the AC power supply against overload and short circuit. The user's battery is connected to the DC output side of the power supply system through the air switch BAT and the contactor KM2, and the air switch plays the role of breaking control and overload and short circuit protection for the battery.

Under normal conditions, all parameters of the rectifier module and pdu are controlled by the monitoring module and work according to the preset parameters or user commands. When the battery voltage is lower than  $-47V \pm 0.5V$ , the monitoring module reports a DC under voltage alarm signal. When the battery voltage is adjustable to  $-46.0V \pm 0.5V$ , the monitoring module controls the contactors KM1 action to turn off non-critical loads. Reserve important loads to prevent power failures. When the battery voltage is adjustable below  $-43.0V \pm 0.5V$ , the monitoring module controls the contactor KM2 action and turns off the important load output. At this time, the power system will stop working. When the external power supply is restored, the system restores to normal at the same time. (The monitoring data is the default value and can be reset by users.)

Except for battery discharge protection, battery and load over temperature protection is disabled by default. You can run commands to enable or disable the function as required.

## 2. Performance indicators

The environment					
Parameter	The minimum	A typical	The biggest	Unit	Annotation
Working temperature	- 25		55	° c.	When $\geq 55^{\circ}\text{C}$ , the power output needs to be reduced
Storage temperature	- 40		80	° c.	
Humidity	10		90	%	Relative humidity, no solidification.
The atmospheric pressure	70		106	KPa	
The altitude	0		3000	m	
Cooling way	Fan forced cooling				

Basic input characteristic					
Project	The minimum	A typical	The biggest	Unit	Annotation
Input voltage range	90	220	290	Vac	
Input frequency	45	50	65	Hz	
Maximum input current			67	A	
The power factor	0.98				The rated load
Input overvoltage protection point	300			Vac	Automatic recovery
Input the overvoltage recovery point	290			Vac	The return is not less than 5V
Input under voltage protection point			85	Vac	Automatic recovery
Input the under voltage recovery point			90	Vac	The return is not less than 5V
Input overcurrent protection					The AC input side is protected by an air switch

Basic output characteristics (Table 1)					
Project	The minimum	A typical	The biggest	Unit	Annotation
The output voltage	42	53.5	58	Vdc	Adjustable through monitoring, no-load test
The output power		10700		W	18725W output at 176 ~ 290VAC input (rated power includes the sum of battery charging power and load power)
		5350		W	Input is 90 ~ 175VAC
Output overvoltage protection point	58.5		60.5	Vdc	Lock
Output current limiting guard point					With output current limiting protection
Output short circuit protection					Long - term short circuit, self - recovery

Basic output characteristics (Table 1)					
Project	The minimum	A typical	The biggest	Unit	Annotation
Over temperature protection					Automatically recovers when the ambient temperature is 65 °C
Battery power-off protection					Provides battery power-off protection
Battery polarity is connected to reverse protection					The battery and power system are not damaged
Voltage regulation accuracy			Plus or minus 1	%	

Basic output characteristics (Table 2)					
Project	The minimum	A typical	The biggest	Unit	Annotation
The temperature coefficient of			+ / - 0.02	% / °C	
Average current imbalance degree			Plus or minus five	%	The load range is from 50 to 100%
Over stroke amplitude of switching machine			Plus or minus five	%	When a module is hot-swappable (the load current should not be greater than the total output current of the working module), the system output voltage fluctuates
Dynamic response recovery time			200	uS	25% to 50% to 25% Load changes 50% to 75% to 50% load change
Dynamic response overshoot			Plus or minus five	%	Rated Output voltage, rated load current
Efficiency indicators	P 91	92		%	220Vac input, rated output voltage, rated load current
	83			%	110Vac input, rated output voltage, rated load current
Startup time	3		8	S	The rated input voltage from startup to output voltage is established to the setting value, and the output of startup needs to use the pre-current limiting function
The pressure drop in the screen			500	mV	

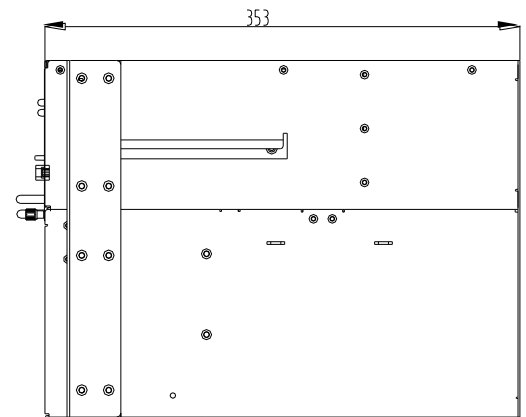
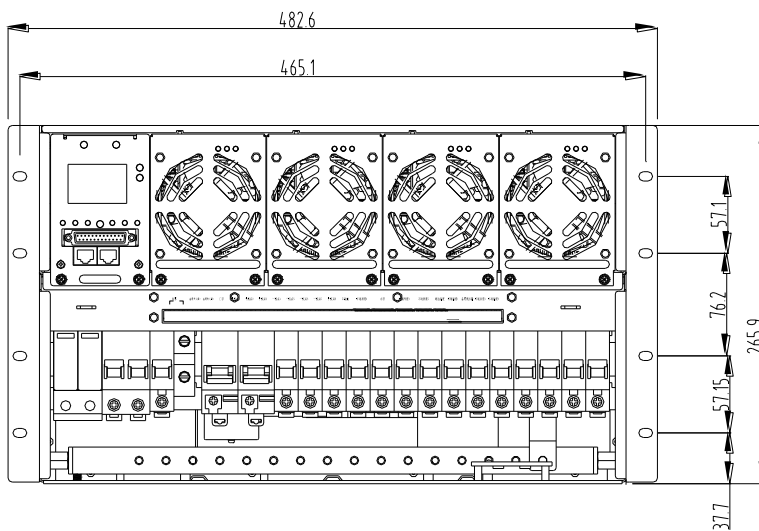
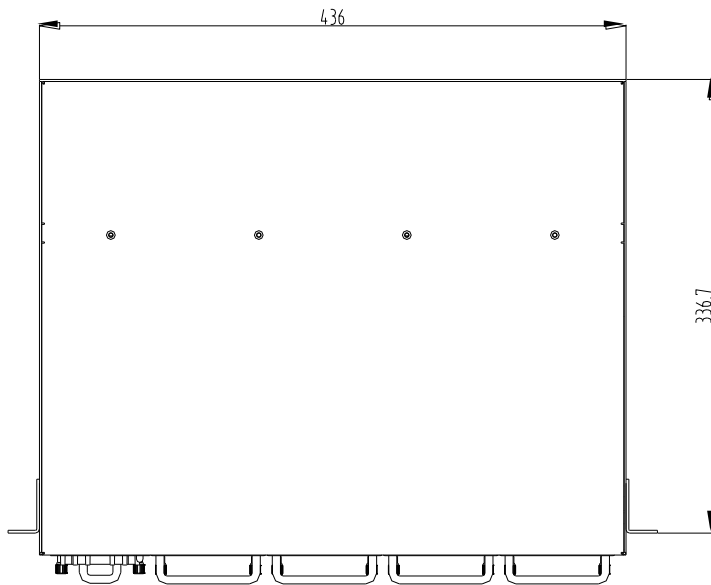
Basic output characteristics (Table 2)					
Project	The minimum	A typical	The biggest	Unit	Annotation
Peak-to-peak noise voltage			200	mV	
The telephone balances the noise voltage			2	mV	

Other features	
Project	Requirements
Acoustic noise	Not greater than 55dB(A)
Smell requirements	Do not produce odors and harmful to health
Requirements for Components	The rated temperature of the selected electrolytic capacitor shall not be lower than 105°C
Requirements for hot swap	The rectifier meets the requirements for hot swap
Mix inserted requirements	The rectifier module can be intermixed
The failure to isolate	The rectifier module can be disconnected from the system reliably after failure
The cooling way	Forced air cooling, the rectifier module has its own fan. The forward air and the back air are put in the front panel of the rectifier module. The fan can be detachable and has the function of temperature control and speed regulation.

Insulation class					
Parameter	The minimum	A typical	The biggest	Unit	Annotation
Input - housing		3535		Vdc	
Input-output		3535		Vdc	
Output - Housing		1414		Vdc	
Insulation resistance	Under normal atmospheric pressure, relative humidity is 90%, and test voltage is 500V DC, the insulation resistance of power input to output, input to ground, and output to ground is not less than 10M $\omega$				

### 3. Mechanical properties

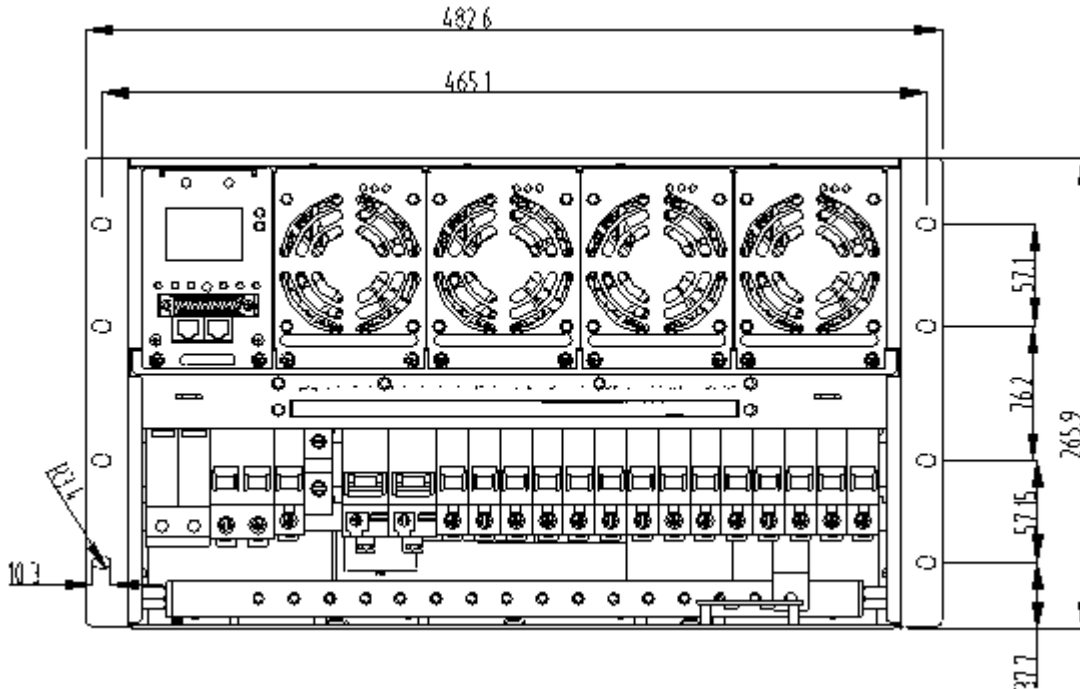
Mechanical properties	
The whole machine size	As shown in the figure below
The weight	$\leq 23.5\text{kg}$ (with modules) $\leq 13.5\text{kg}$ (without module, rack + power distribution)





## 4. Installation instructions

### 4.1. Installation dimensions diagram



### 4.2. Installing system Power Supplies

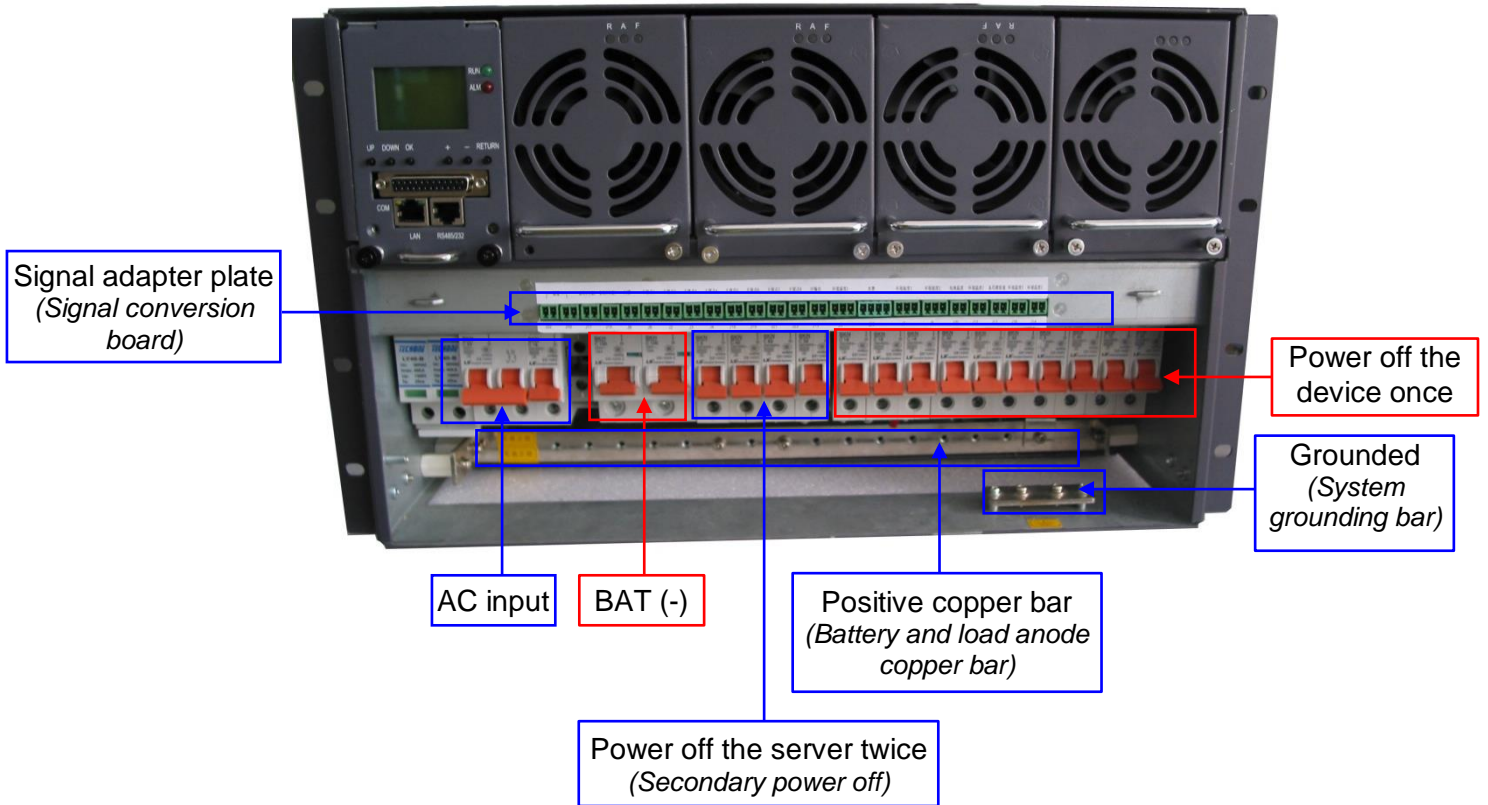
The VT-42IPS-48200A is an embedded power supply. When installing the VT-42IPS-48200A, hold it flat and insert it into the specified position in the cabinet. Ensure that the VT-42IPS-48200A is properly installed.

Note: Cabinets are provided by customers.

## 5. Electrical connection

### 5.1. Description of Electrical Connections

The electrical connection between the main box and the outside is carried out through the wiring terminal of the system. The interface position of the wiring terminal of the system is shown as follows:



## 5.2. Electrical Connection Process

Electrical connections between a main box and external devices include AC input, DC output and batteries, communications cables, and ground cables. As described below, the key points of electrical connection are safety and reliability.

### (1) System AC lead-in wire connection

VT-42IPS-48200A system's AC inlet terminal is a 2PIN air switch, located in the front panel of the system; The AC connection wire is crimped on the air switch input end.

### (2) The system dc load line connection

The load terminals of the VT-42IPS-48200A system are 14 air switches, which are located on the front panel of the system. The connecting wires can be directly inserted into the air switch.

- A. Selection and routing of load line According to the requirements of engineering design, select the appropriate cable.
- B. Connect one end of the positive wire to the positive copper bar in front of the system;
- C. Connect one end of the negative connector wire to the air switch in front of the system;

### (3) System DC battery wire connection

The wiring terminal between the system and the battery is an air switch, identified as BAT(-), which is used to connect the battery. The connecting cable can be directly inserted into the air switch to tighten the screw. The following describes how to connect batteries.

- A. Make positive and negative connecting wires (including connecting wiring terminals and positive or negative marking).
- B. Bind the battery connection cables.

- C. Connect one end of the positive wire to the positive copper bar in front of the system;
- D. Connect one end of the negative connecting wire to the air switch in front of the system;

(4) Recommended cable specifications

The name of the	Symbol	AWG/ Minimum cross- sectional area (#/mm <sup>2</sup> )	AWG/Maximum cross- sectional area (#/mm <sup>2</sup> )	Temperature grade (°C)	Pressure (V)
Output load line	Load1 - to Load14 -	6 # / 10	4 # / 16	105	600
Enter the ground	PEin	9 # / 6	6 # / 10	105	600
Utility the zero line	Nin	6 # / 10	4 # / 16	105	600
The line of fire	Lin	6 # / 10	4 # / 16	105	600
The battery is	(BAT +)	2 # / 35	1 # / 50	105	600
The battery negative	(BAT -)	2 # / 35	1 # / 50	105	600

(5) Ground cable installation

Protection grounding connection: the grounding position is 10mm in front of the system of VT-42IPS-48200A. The above cable connects the housing ground point of the system main box to the external earth.

(6) Installation of communication cables

Communication cable ports LAN and RS485 are located in the monitoring module of the VT-42IPS-48200A system. LAN is an Ethernet communication port, and RS485 is a communication port used to communicate with the upper computer.

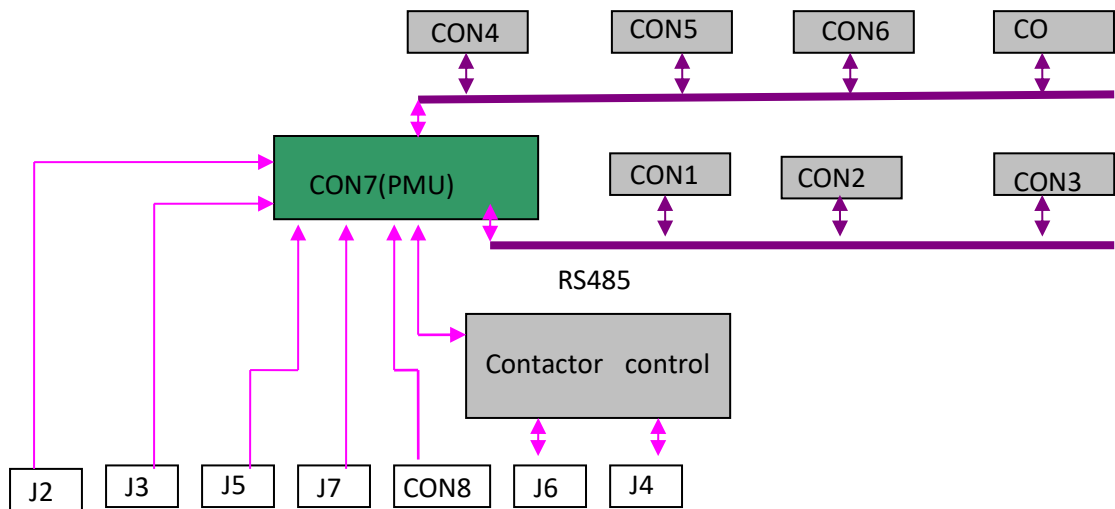
LAN Ethernet communication: Directly connect to the computer through the network crossover cable, or connect to the computer through the router through the ordinary network cable.

RS485 communication mode:

- A. Connect one end of the communications cable to the RS485 port on the monitoring module of the VT-42IPS-48200A.
- B. Connect the second pin of the communication line to the RS-485 converter (RS485 to RS232) RS485+, the third pin to the RS-485 converter RS485-, and connect the COM port of the computer through the RS232 port of the converter.

### 5.3. Midplane Ports

The BACKplane VT-42IPS-48200A BACKboard of the system is connected to the power module and monitoring module of the system. The DC output passes through the backboard to the busbar. The control signals of the contactor of the monitoring module drive the contactor through the backboard, and the alarm signals of the SPD in the power distribution subrack are transferred to the monitoring module through the backboard. The monitoring module communicates with the rectifier module through the board, and signals such as the shunt also enter the monitoring module through the board.

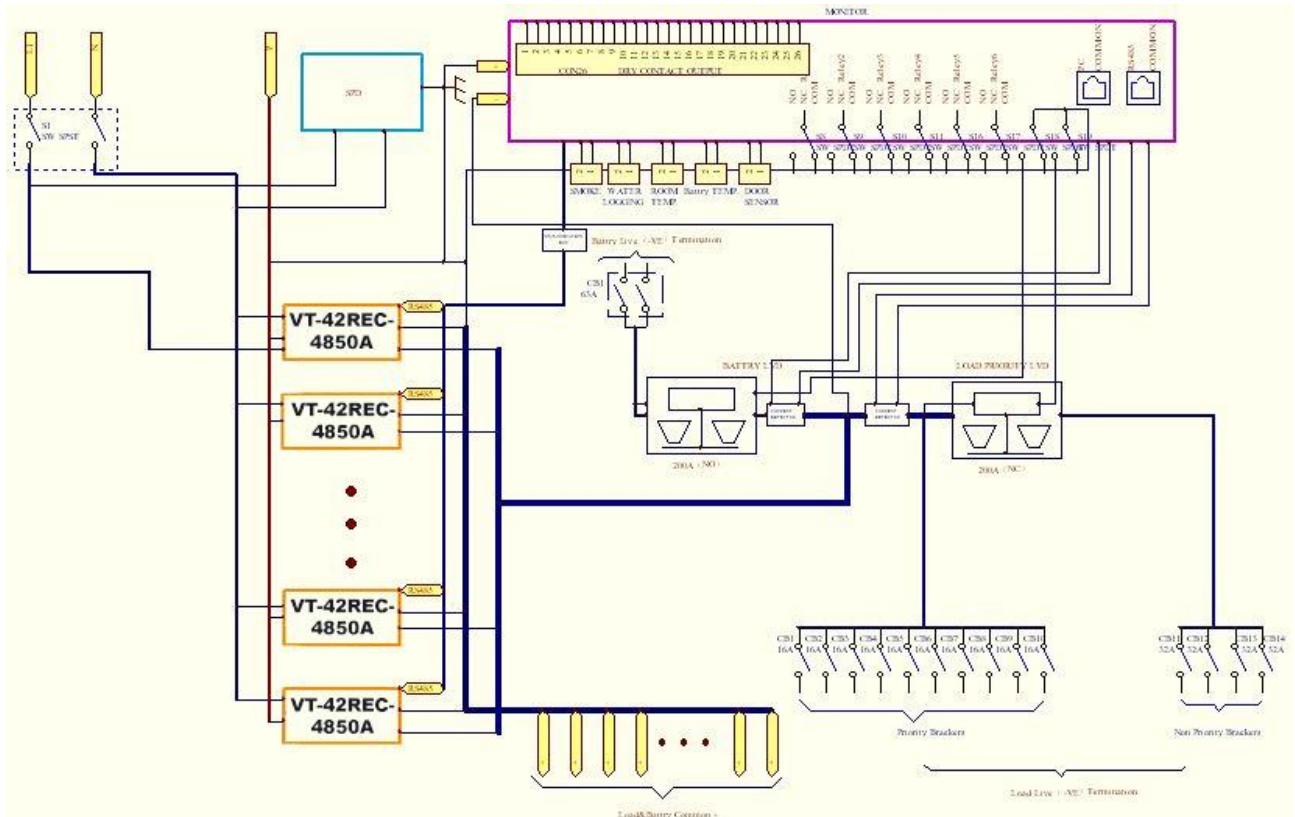


Backplane design function block diagram

The interboard interface is shown as follows:

Number of the connector on the board	Signal name of this board	I/O	The signal function	Name of other connected board, connector number and signal name	Other instructions
J2	Ac voltage (PHASE A) test socket	I	Ac voltage (A-phase) signal input	Connect ac A-phase voltage	There is no
J3	Socket for the ALARM signal port of the AC SPD	I	Surge protection device alarm signal input	Connect the alarm signal of the AC SPD	There is no
J4	Battery contactor control signal port socket	O	Battery contactor controls signal output	Connect the cable to the contactor control coil	The sampling signal cable terminal has a position installation requirement
J5	Battery shunt signal interface socket	I	Battery sampling shunt signal input	Cable connection shunt sampling signal	The sampling signal cables have positive and negative polarity requirements
J6	Load contactor control signal port socket	O	Load control contactor signal output	Connect the cable to the contactor control coil	The sampling signal cable terminal has a position installation requirement
J7	Load shunt signal interface socket	I	Load samples shunt signal input	Cable connection shunt sampling signal	The sampling signal cables have positive and negative polarity requirements
CON8	Socket for load and battery output detection signals	I	Load and battery on-off detection signal input	There is no	Note: D18 - D19 batteries D1 - D17 load
CON1, CON2, CON3, CON4, CON5, CON6, CON15	Ports on the rectifier module	I/O	Rectifier module signal input and output, rectifier module power output	There is no	There is no
CON7	PMU 96-pin connector	I/O	Monitor module signal input and output	Connect the socket to the PMU connection terminal	There is no

## 6. Power distribution block diagram of VT-42IPS-48200A



## 7. VT-42MM monitoring module function description

### 7.1. Monitoring Module Functions

Feature	Said Ming
Remote monitoring function of monitoring unit by upper computer	The upper computer can query, set and control the system monitoring remotely at any time, and realize the function of "three remote"
Monitoring module Manages the rectifier module	The monitoring module sends control adjustment commands or parameter obtaining commands to the monitoring module through RS485 communication
Battery management	Management "Battery low voltage, battery power-off, floating charge management, temperature compensation, capacity test"
Monitor the system output management function	Detection and control system
LED indicator function	Signal that
6 way dry point output function	Dry point setting
COM port signal	RS485, LAN
LCD display	Menu to set and modify
For details, see "VT-42MM Monitoring Module Specifications".	

### 7.2. Monitoring background software

For detailed description of background software, see the software Operation Manual

## 8. Function description of the VT-42REC-4850A rectifier module

### 8.1. Rectifier Module Parameters

Project	Unit	The minimum value	Typical values	The maximum	The test conditions
Ac input voltage	Vac	90	220	290	
Frequency of ac input voltage	Hz	45	50	65	The rated load
Input power factor		0.99			Rated voltage/rated load
Output voltage range	Vdc	44	53.5	58	
The output current	A	0	50		The value ranges from 176 v ac to 290V ac
	A	0	22		The input value ranges from 90 v ac to 175V ac
Output voltage regulation accuracy				Plus or minus 1%	
Peak-peak Vp-P	mV			200	Add one 0.1uF ceramic capacitor and one 10uF electrolytic capacitor, and the bandwidth is 20MHz.
The output power	W	0	2900		176Vac ~ 290Vac input to ensure 2900W output
	W	0	1200		Input is 90Vac ~ 175Vac
The output efficiency	%	92	93		220V AC input (1, 220Vac input, rated output voltage, more than 25% rated load current 2, up to 94%)
	%	86			110 v AC input
Input overvoltage protection	Vac	300			Can be recovery from
Input overvoltage protection recovery point	Vac	290			
Input under voltage protection	Vac			85	Can be recovery from
Input under voltage protection recovery point	Vac			90	
Output overvoltage protection point	V	58.5	59	60.5	1. Internal failure of the module leads to overvoltage, and the module itself is locked 2, the module plus output voltage within the range of overvoltage protection point, the module works normally

Project	Unit	The minimum value	Typical values	The maximum	The test conditions
Output current limiting protection	A	54			Since the recovery
Short circuit protection	A	Long - term short circuit, self - recovery			
Power supply over temperature protection		Automatically recovers when the ambient temperature is 65 ° C			
For details, see VT-42REC-4850A Rectifier Module Specifications.					

## 8.2. Installing a Rectifier Module

Put frame corresponding to the location of the rectifier module is inserted into the main box, with a handle on the panel of the rectifier module, one hand clenched hand, hand held unit, slowly into the corresponding slot, until the parts after the terminals of the panel is inserted into the main box system motherboard corresponding socket, finally, the shake hands handle of above fixed screw on the main box, installation is complete; When exiting the main box, loosen the screws on the panel, hold the handle, and slowly remove the module from the slot.

## 9. System maintenance

- (1) Fault phenomenon: The yellow light of the rectifier module flashes continuously, indicating communication failure;  
 Maintenance: Check whether the communication network is loose and whether the network interface is damaged.
- (2) Fault symptom: The yellow indicator on the rectifier is steady on  
 Maintenance: check whether there is fan blockage, whether the load current exceeds the maximum current; If the AC voltage is too low, the automatic derating function is enabled. Whether the temperature is too high warning; Whether the remote shutdown function is configured on the background screen.
- (3) Fault symptom: the rectifier module is red on  
 Maintenance: whether the voltage is too high or too low overvoltage and under voltage protection; Whether the fan is blocked, whether the ambient temperature is too high, whether the load end is short circuit;  
 When the system red light is on, the module is abnormal and needs to be returned to the manufacturer for repair.
- (4) Fault phenomenon: rectifier module red, yellow, green light is not bright;  
 Maintenance: check whether there is AC input. If there is no input, please check the input circuit. If there is input and the light is off, the module is damaged and return to the manufacturer for repair.



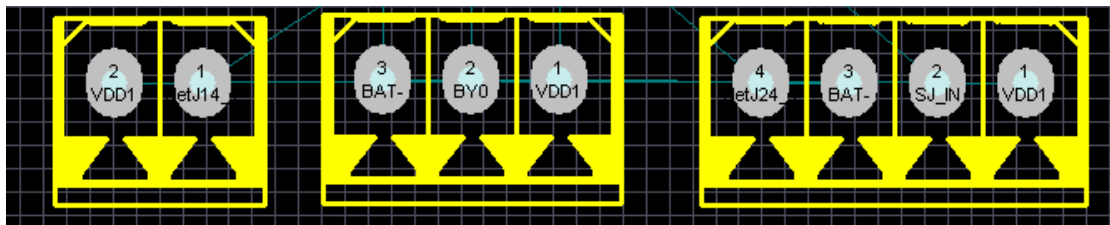
## 10. Signal description of the VT-42IPS-48200A converter box terminal

### 10.1. PCB screen printing diagram



### 10.2. Description of foot position sequence

In the silkscreen figure above, the pin sequence of the terminals used is as follows: from right to left, the first pin on the right is 1, the second pin is 2, and the third pin is 3... And so on, as shown below:



### 10.3. Interface Definition:

- 12V OUT: 12VDC power output (powered by the smoke alarm).
- SMOKE: pin 1 is the signal input, pin 2 is the monitoring output 12V. (Note: Smoke model: SDLH-93R, manufacturer Sensidek)
- Door-control: indicates the access alarm input. Pin 1 is the access signal input, pin 2 is the 12V power supply.

- BK1: standby switch quantity 1 pin 1 is switch quantity input, pin 2 is 12V power supply;
- BK2: Standby switch 2, pin 1 is switch input, pin 2 is 12V power supply;
- 5V OUT: 5V power supply output (standby), 1 pin is 5V positive, 2 pin is 5V ground;
- Am-temp1: ambient temperature input 1, 1 pin for signal input, 2 pin for 5V positive;
- Am-temp2: Ambient temperature input 2, 1 pin as signal input, 2 pin as 5V positive;
- Am-temp3: ambient temperature input 3; Pin 1 is the signal input, pin 2 is 5V positive;
- Bat-temp: battery temperature input, pin 1 for signal input, pin 2 for 5V positive;
- (Note: Temperature sensor is 10K temperature resistance)
- Am-humi1: ambient humidity 1; Pin 1 is 5V positive, pin 2 is signal input, pin 3 is 5V ground;
- Am-humi2: environmental humidity 2, 1 pin is 5V positive, 2 pin is signal input, 3 pin is 5V ground;
- Am-humi3: environmental humidity 3, 1 pin is 5V positive, 2 pin is signal input, 3 pin is 5V ground;
- BM1: standby analog quantity 1 (undefined);
- WATER: WATER signal input, 1 pin for 5V power supply, 2 pin for WATER signal input, 3 pin for 5V ground, 4 pin for sensor current limiting pin -- protection pin;
- (Note: Water sensor model YW515, manufacturer: Beijing Baolima)
- JTD1: Dry point 1, as shown in the figure above, dry point 1 common point and normally closed point from left to right;
- JTD2: Dry point 2, as shown in the figure above, dry point 2 common point and normally closed point respectively from left to right;
- JTD3: Dry point 3, as shown in the figure above, dry point 3 common point and normally closed point respectively from left to right;
- JTD4: Dry point 4, as shown in the figure above, dry point 4 common point and normally closed point respectively from left to right;
- JTD5: Dry point 5, as shown in the figure above, dry point 5 common point and normally closed point respectively from left to right;
- JTD6: dry point 6, as shown in the figure above, dry point 6, common point and normally closed point respectively from left to right;
- JTD7: dry point 7, as shown in the figure above, dry point 7 from left to right, common point and normally closed point;
- JTD8: Dry point 8, as shown in the figure above, dry point 8 common point and normally closed point respectively from left to right;

**The default dry contacts are as follows:**

Dry point 1: AC power failure; Dry point 2: rectifier module; Dry point 3: Power off at one time. Dry point 4: access control; Dry point 5: smoking ban; Dry point 6: water immersion; Dry point 7: custom; Dry point 8: Custom.

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