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# Rectifier User Manual

Version: A04

Model: BR2502500

HF Rectifier module 220V/10A

# Catalogue

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## 1. Electrical Specifications

### 1.1 Input Feature

Input	Single
Input Voltage Range	90Vac to 285Vac
Rate input Voltage	220Vac
Normal Input	100Vac to 240Vac
Frequency Range	45Hz-65Hz
Max Input Current	14.2A±10%@176Vac
Surge Current	Compliant standard: ETSI300132-3
Efficiency	≥93%@220Vac 100% Load
PF	≥0.98@220Vac100% Load
Rate Capacity	2500W(176Vac~265Vac) 1200W(90Vac~175Vac)
Input fuse	L Wire ,Fuse 30A
Leakage current	<10mA@264Vac
Max input Voltage	310Vac

### 1.2 Output Feature

#### 1.2.1 Output voltage current regulation

Output Voltage	+220Vdc
Output Voltage Regulation	≤±0.5Vdc
Output Range adjustable Range	+190Vdc~+300Vdc
Line regulation	±0.1%
Load regulation	±0.5%
Voltage precision	±0.5%
Current precision	±0.5%
Output current deviation	≤0.5%
Output current Regulate deviation	≤±0.3A
Current Sharing (176Vac~264Vac, 50%~100% load)	≤±5%
Min- Current	0A
Rate current	10A
Peaking current	11A
Tempe. coefficient (1/°C)	≤±0.02%
Rate Capacity	2500W(176Vac~264Vac) 1200W(90Vac~175Vac)

#### 1.2.2 Output ripple and noise

Output Voltage	Ripple and Noise (Peaking-Peaking)
+250Vdc	2.34Vp-p@25°C; (Testing based on rate Input voltage & Output Voltage ,100% loading )

Note: 1) Ripple and Noise testing:Ripple and noise Default as 20 MHz.

**1.2.3 Output dynamic response**

Voltage overshoot	Adjustment slope	Loading
+250V±5%	0.1A/uS	25% to 50% Load 50% to 75% load

Note: Adjustment slope Cycle 4ms。

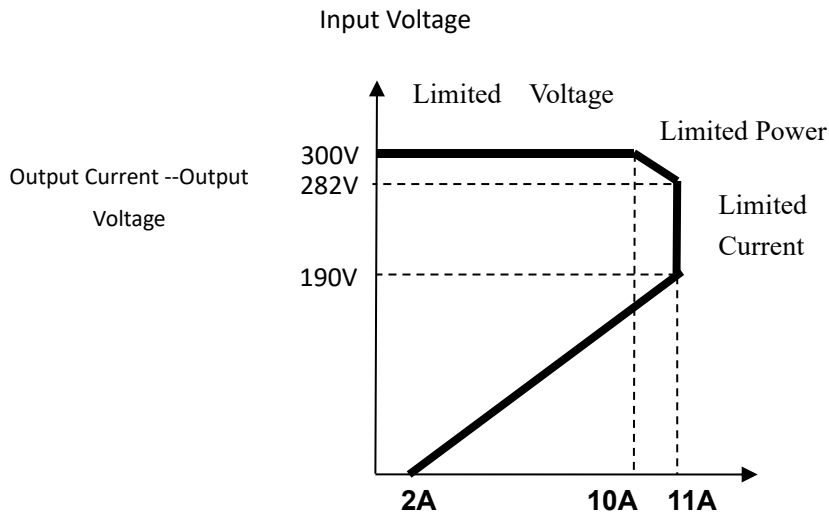
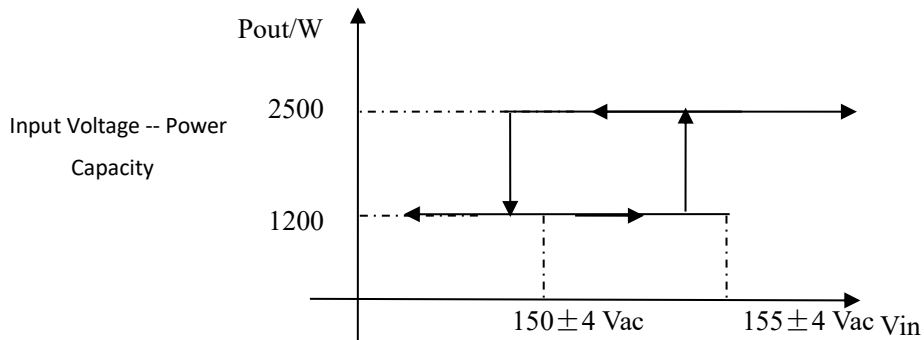
**1.2.4 Output Overshoot**

Output Voltage	Overshoot Voltage	
	On	OFF
+250V	≤5%	≤5%

Note:

Loading Range: Minimum to maximum.

**1.2.5 Power Switch Point**



**1.2.6 Power on output delay time**

Output Voltage	220Vac@25°C
+190V~+300V	3S~8S

**1.2.7 LED Indicator**

The power LED is installed on the power panel side and the output status is shown in the table below.

Indicator	LED Color	Normal Status	abnormal status	Abnormal Reasons
Power running indicators	Green	ON	OFF	Mains fault (No AC input, AC input under voltage) or Auxiliary power abnormal .
Protect indicators	Yellow	OFF	ON	AC Input Over-Voltage; Operation Environment or Rectifier over-temperature; Communication Fault;Output Under Voltage; Output Short circuit.
Fault Indicator	Red	OFF	ON	Output Over-voltage
		OFF	FLASH	Fans Fail
Note: Rectifier module under Manual Operation,, Green LED will be Flash				

### 1.2.8 Fault Display

The module alarm information is flashed in real time on the LED in the form of a fault code. The fault code is shown in the following table.

Fault Code	Code Meaning
E31	Output Under Voltage
E32	Rectifier module over-temp.
E33	AC Under-voltage
E36	Output Over voltage
E38	Fans Fault

### 1.2.9 Communication function of Rectifier and Monitor Control Module

Rs485 Interface , Rectifier module and Monitor control Module

The 485 interface of the rectifier module application with isolated .

Main function of Rectifier module communication :

#### 1、 Remote communication

The module's protection signals (input fault, over temperature, output overvoltage, over-current, etc.) and fault signals will be transmitted to the monitoring unit.

#### 2、 Remote detection

Detect rectifier module output Voltage /Current will be reports to Monitor module

#### 3、 Remote control

According to the monitor Control Module Orders,Control Rectifier module ON/OFF, Float Charge and Equ--charge and Charge switching.

#### 4、 Remote adjust

According to the monitor control module orders , adjust rectifier module output Voltage,and adjust the Output current limited current point between 10%~ 100% .

## 1.3 Protection Function

### 1.3.1 Output Limited Current Protection

Output Voltage	Current Limited Point	Note
+250V	11A	Limited Current Output

### 1.3.2 Output Circuit Protection

Output Voltage	Note
+250V	Short circuit current limit 2A, After the fault release, the output voltage will be recovered

### 1.3.3 Output over Voltage

Output Voltage	Default Protection Point
+250V	290±5V. (Three times Over voltage, Rectifier module Will be Locked )

Note : Under Locked Status, need to Disconnect AC Power firstly, then Connect AC power again, rectifier module will be working again )

### 1.3.4 Input Over Voltage Protection

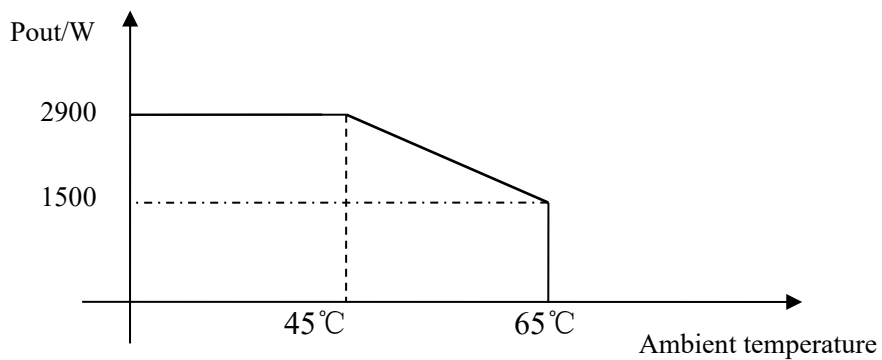
Input Voltage	Note
310±10Vac	Output Will be closed, Backlash Voltage >10V

### 1.3.5 Input Under Voltage Protection

Input Voltage	Note
80±5Vac	Recovery Voltage 90V±5V, Voltage Backlash >5V

### 1.3.6 Over-Temp. Protection

Temp.	Note
≤55°C	Note
55°C~65°C	The module support maximum output power without over-temperature protection and the module running normally.
>65°C	The module will automatically derate to ensure a long-time stable output of at least 50% of rated power



## 2. Insulation Performance

**2.1 Insulation resistance**

Input To Output	DC500V 10MΩmin (at room temperature)
Input To FG	DC500V 10MΩmin(at room temperature)
Output To FG	DC500V 10MΩmin(at room temperature)

**2.2 Isolation Voltage**

Input To Output	2000Vac 50Hz (2828Vdc) 1minute NO Flash over and Breakdown
Input To Chassis	2000Vac 50Hz (2828Vdc) 1minute NO Flash over and Breakdown
Output To Chassis	2000Vac 50Hz (2828Vdc) 1minuteNO Flash over and Breakdown

**3.Safety standard**

There is no mandatory certification requirement, and the power supply safety is based on the following standards:

**GB4943-2001**

**4.EMC****4.1 EMI**

**The power supply shall compliance with the following Criterion:**

**EMI Compliant with the the Below Standard:**

**4.1.1 Conduction Emission :**

- \*EN55022, CLASS A
- \*GB9254, CLASS A
- \*FCC PART15 CLASS A

**4.1.2 Radiated Emission :**

- \*EN55022, CLASS A
- \*GB9254, CLASS A
- \*FCC PART15 CLASS A

**4.2 EMS**

**The power supply shall compliance with the following Criterion:**

**4.2.1 ESD**

- \* Chapter 5 of GB17626.2-1998 specifies the test level 3

**4.2.2 EFT**

- \*Chapter 5 ofGB17626.4-1998 specifies the test level 3

**4.2.3 Surge**

- \*Chapter 5 of GB17626.5-1999 specifies the test level 3

**4.2.4 Immunity to conducted disturbances,induced by radio-frequency fields**

- \*Chapter 5 of GB17626.6-1998 specifies the test level 3

**4.2.5 Power frequency magnetic field immunity test**

- \*Chapter 5 of GB17626.8-1998/ specifies the test level 4

**4.2.6 Damped oscillatory magnetic field immunity**

- \*Chapter 5 of GB17626.10-1998/ specifies the test level 3

**4.2.7 Radiated, radio-frequency, electromagnetic field immunity**

- \*Chapter 5 of GB17626.3-1998/ specifies the test level 3

**4.2.8 oscillatory magnetic field immunity**

- \*Chapter 5 of GB17626.12-1998/ Specifies the test level 3(1M and 100 KHz oscillation Magnetic test)

#### 4.2.9 Input harmonic current

\*IEC 61000-3-2 [6] CLASS A

### 5. Working environment

#### 5.1 Ambient temperature

\*Working Temp:  $-10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ . ( $-40^{\circ}\text{C}$  Normal Working)

\*storage Temp:  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ .

\*Transport Temp:  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ .

#### 5.2 Relative Humidity

\*Working RH: 5%~95% (No condensation)

\*Storage RH: 5%~95% (No condensation)

#### 5.3 Altitude

\*working Altitude : 0~4000M , based 2000m , For every 200 m increase in altitude, the temperature drops by  $1^{\circ}\text{C}$

\*Storage Altitude : 0~4000M, based 2000m, For every 200 m increase in altitude, the temperature drops by  $1^{\circ}\text{C}$

#### 5.4 Cooling

\*The rectifier module with fan, forced air cooling, air is sent out after the wind is coming forward, the fan is placed in the front, and the fan has temperature control speed regulation function.

#### 5.5 vibrate tolerance

##### 5.5.1 Working environment:

sinusoidal vibration: 5~9Hz: amplitude 3.5mm; 9~200Hz: acceleration  $10\text{m/s}^2$ ; 3 axial direction, sweeping vibration 5 times in each direction, 1OCT/min (1 octave/min).

##### 5.5.2 Transportation environment:

random vibration: 2~10Hz:  $10\text{m}^2/\text{s}^3$ ; 10~200Hz:  $3\text{m}^2/\text{s}^3$ ; 200~500Hz:  $1\text{m}^2/\text{s}^3$ ; 3 axial, 30min in each direction.

(Reference standard: ETS300019-2)

#### 5.6 Impact tolerance

\*Working environment: acceleration  $250\text{m} / \text{s}^2$ ; pulse width 6ms; 3 axes 6 to each collision 500 times.

\*Transportation environment: acceleration  $400\text{m} / \text{s}^2$ ; pulse width 6ms; 3 axes 6 to each collision 500 times.

(Reference standard: ETS300019-2)

#### 5.7 Drop

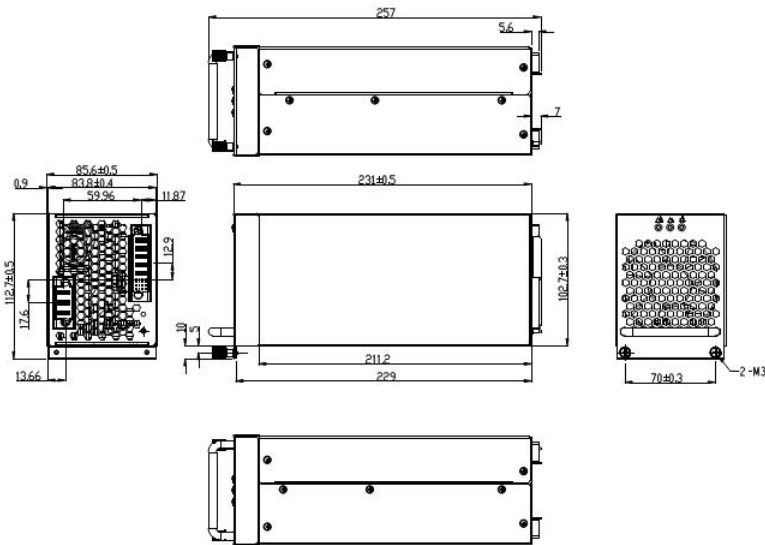
Transportation environment: drop height 1m; bottom surface 1 time.

(Reference standard: ETS300019-2)



## 6. Size

H×W×D: 83.8mm×112mm×257mm



## 7.N.W

<3.8kg

## 8.Chassis IP Protection Level

IP20 (User normal maintenance operation surface)

## 9.Transportation and Storage

The product should be placed in a warehouse that is affected by dry, ventilated and non-corrosive gases with a temperature of  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  and a relative humidity of not more than 80%.

The product has a strong packaging when transported. The outside of the box complies with the relevant national standards and should have signs such as “careful handling” and “moisture proof”. The box containing the product is allowed to be transported by any means of transport. Direct rain and snow strikes and mechanical impacts should be avoided during transportation.

## 10.other Requirements

Item	Requirement	Note
noise	Less than 55dBa	
odor	not produce odor and harmful odor	
Components	All devices meet the de-rating	
Hot swap	Rectifier module for hot swap	
Failure isolation	After the rectifier module fails, it can be reliably separated from the system.	

## 11.MTBF

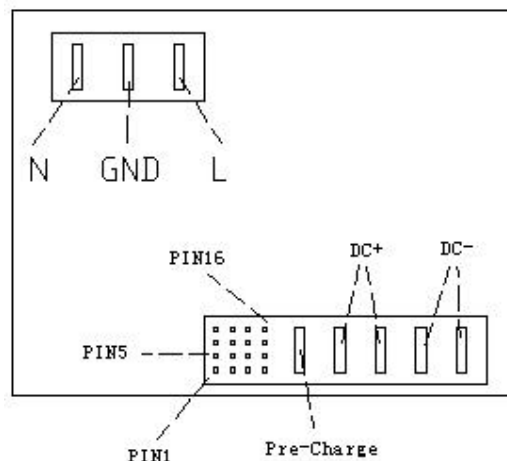
1\*10<sup>5</sup>h; 25°C, Rate Input,100% loading.

## 12.Connector Pin definition

	Pin	Signal	Remark	Contact sequence
AC input	1	Rectifier module AC input	L	2
	2	Rectifier module protection Ground	PE	1
	3	Rectifier module AC input	N	2
DC output and Signal	6	NC	NC	3
	7	NC	NC	3
	8	NC	NC	3
	9	Rectifier communication wire	RS485B	3
	10	NC	NC	3
	11	NC	NC	3
	12	NC	NC	3
	13	Rectifier communication wire	RS485A	3
	14	NC	NC	3
	15	NC	NC	3
	16	NC	NC	3
	17	NC	NC	
	18	Rectifier share current wire	SHARE-	
	19	Rectifier share current wire	SHARE+	
	20	NC	NC	
	21	NC	NC	
	5	NC	NC	1
	4	Rectifier output +	DC+	2
	3	Rectifier output+	DC+	2
	2	Rectifier output-	DC-	2
	1	Rectifier output-	DC-	1

(1) The description of the pin is as follows:  
 Block address definition: The module internally pulls up the address line. ADDRESS0~4 can be left floating outside the module or shorted to the address line GND. Shorting means "1", floating means "0", such as ADDRESS0 external and address If the line GND is shorted and the

other address lines are left floating, the rectifier module address is 1. The address range of the



rectifier module is 0 to 31.

(2) Pre-Charge pin is used to pre-charge the output capacitor inside the rectifier module when the rectifier

## **13. Product Maintenance**

### **13.1 Product free maintenance time**

The free maintenance level of this product is Class B, and the free maintenance period (warranty period) is 1 year.

### **13.2 On-site maintenance**

The power module has a hot swap function, and the on-site repair mode is module replacement.