

**Specification**  
**Version: A**

## **Power System of High Performance and High Reliability**

### **NVRM4890 Embedded Power System**

**Input: 90~280Vac; Output: -42~-58Vdc; Power: 4815W**



#### **Main features**

- System total capacity: -54.3Vdc/90A
- Standard 19in./2U, easy to be embedded to all kinds of telecom equipments and cabinets.
- Adoption of active power factor compensation technology with factor greater than 0.98
- Wide operating range of AC input voltage: 90~280Vac
- System operating temperature range:-5°C — +55°C
- Expanded operating temp. range:-+55°C — +65°C
- Soft switch tech with high efficiency more than 91%
- Perfect battery management, LVLd and LVBD protection
- Hot-swappable
- Excellent lightning proof design applicable to areas with frequent thunder storms.
- Input over/under voltage protection
- Output over voltage/current protection
  - Microwave communication
  - Output short circuit protection
  - LCD and Ethernet interface
  - Compliant to UL<sup>1</sup>60950, CSA<sup>2</sup>C22.2 60950-00, VDE<sup>3</sup>0805 IEC60950
  - CE<sup>4</sup> mark meets directives of 73/23/EEC and 93/68/EEC

#### **Application**

- Program controlled exchanges
- Access network
- Transmission equipment
- Mobile communication
- Satellite communication ground station

NVRM4890 embedded power system is a newly-designed product of PRTEM, which is of high performance and high reliability. The system size is standard 19". /2U, can be embedded to all 19" telecom equipments and cabinets.

- 1 UL is the registered brand of Underwriters Laboratories
- 2 CSA is the registered brand of Canadian Standards Association
- 3 VDE is the registered brand of Verband Deutscher Elektrotechniker
- 4 All the products are CE compliance

### **System Specifications**

#### **1. NVRM4890 system configuration:**

- 1.1 3 Rectifier modules (NVRM4830);
  - 1.2 1 Monitoring module (NVSM-A);
  - 1.3 Distribution part of NVRM4890
- DC output: 16A\*2 10A\*2 (Load) 50A\*1 (Battery)

#### **2. NVRM4890 Properties**

<b>Input</b>					
<b>Parameter</b>	<b>Min.</b>	<b>Typical</b>	<b>Max.</b>	<b>Unit</b>	<b>Remark</b>
Input voltage range	90	220	280	Vac	
Input frequency	45	50	65	Hz	
Input current			29.7	A	
Power factor	0.98				Rated input/ Rated load

<b>Output</b>					
<b>Parameter</b>	<b>Min.</b>	<b>Typical</b>	<b>Max.</b>	<b>Unit</b>	<b>Remark</b>
Output voltage range	42	53.5	58	Vdc	
Output current range	0		90	A	170-290VAC
	0		45	A	90-170VAC
Regulation			±1	%	
Load regulation			±1	%	
Voltage regulation			±1	%	
Weighted psophometric noise			2	mv	
Wide frequency noise voltage			50	mv	3.4KHz~150KHz
			20	mv	150KHz~30MHz
Ripple(Vp-p)			200	mv	Rated input/ output, add 0.1uF film capacitor and10uF high frequency electrolyte capacitor, oscilloscope band width is20MH z
Output power			4815	W	Rated input/Full load output
Output efficiency	91			%	220Vac input
	83			%	110Vac input
Turn-on time	3		8	S	
Overshoot and undershoot @start-up/shutdown			±5	%	
Hold-up time	10			Ms	
Sharing current			±5	%	

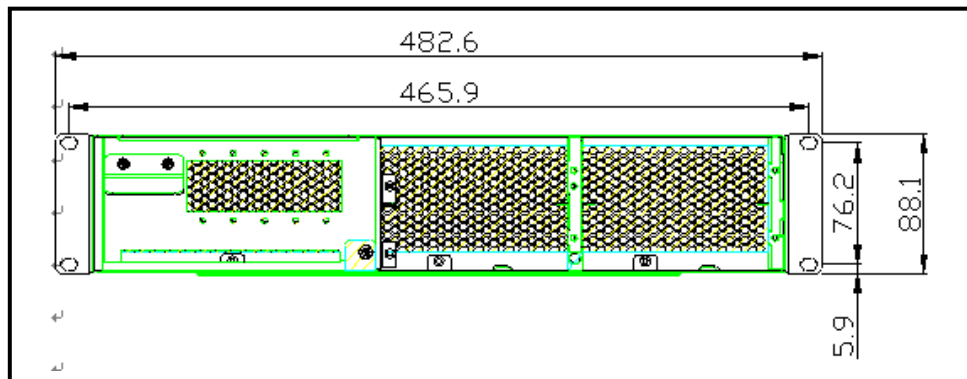
**System Specifications**

<b>Ambient</b>					
<b>Parameters</b>	<b>Min</b>	<b>Typic</b>	<b>Max</b>	<b>Unit</b>	<b>Remark</b>
Operating temp.	-5		55	°C	
Extended operating temp.	55		65	°C	Module derating
Storage temp.	-40		70	°C	
Humidity	10		90	%	Relative humidity, no condensing
Altitude	-60 -200		400 0 130 00	m ft	For operation above 2500m (5000 ft.), maximum operating temperature is derated by 2°C per 305m (1000 ft.).
Earthquake rating	4			Zon e	
Noise		45		dB	Relative to fan speed, load and ambient temperature
Harmonic emission	EN/IEC61000-3-2				
Radiated emission	EN55022 - Class B				
Conducted emission	EN55022 - Class B				
ESD	EN/IEC 61000-4-2 Level 3 (Contact Discharge 6 kV, Air Discharge 8 kV).				
Radiated immunity	EN/IEC 61000-4-3 Level 3 (10 V/m).				
EFT/B	EN/IEC 61000-4-4 Level 3 (2 kV, 5 kHz Repeat)				
Lightning surge Failure free Damage free	EN/IEC61000-4-5 Level 4 ((Common mode 4Kv Differential mode 2kV). ANSI C62.41 Level A3 ((Common mode and differential mode 6kV)				
Conducted immunity	EN/IEC 61000-4-6 Level 3 (10 V/rms).				
Reliability		400,000		Hours	25°C full load in compliance with SR-332
Isolation properties input-chassis input - output output – chassis	1500 1500 500			Vac Vac Vdc	
Leakage current			3.5mA		264Vac Input

<b>Protection</b>					
<b>Item</b>	<b>Unit</b>	<b>Min.</b>	<b>Typical</b>	<b>Max.</b>	<b>Recovery Property</b>
Input over-voltage	Vdc	285	295		Auto recovery
Input over-voltage recovery point	Vdc	280			Hysteresis not less than 5V
Input under-voltage	Vdc			85	Auto recovery
Input under-voltage recovery point	Vdc			90	Hysteresis not less than 5V
Output over-voltage	V	58.5	59	61.5	Lock up
Output current-limiting	A	96	99	102	Auto recovery
Short circuit	A	Long-term short circuit permissible; Hiccup when short circuit detected, power off if short circuit continues after 5min's hiccupping.			
Over-temperature		Auto recovery within ambient temperature of 60°C			

Fan failure	When one fan fails, the module de-rates,(when input voltage is 220Vac, the output current is15A, 7.5A with 110Vac) and report alarm till the module high temp. protection cut off output: When both fans fail, the module cut off output after reporting alarm.
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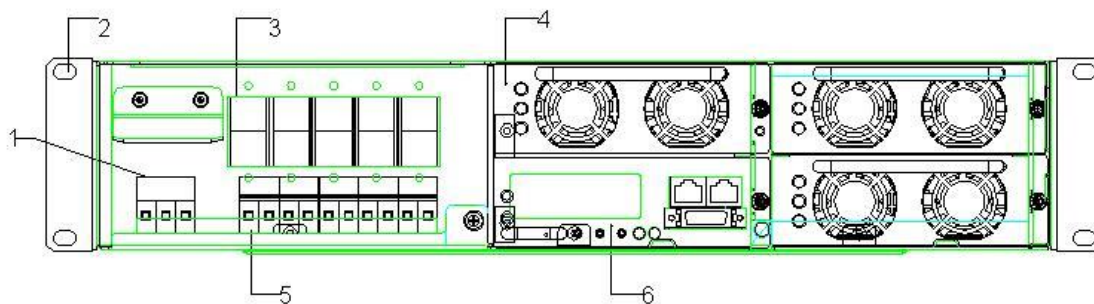
<b>Mechanical Spec</b>	
Length (in./mm)	10/255
Width (in./mm)	19/482.6
Height (in./mm)	3.46/88
Weight(kg)	≤7



### 3. Installation of NVRM4890

When power system NVRM4890 is transported, the monitoring module and all rectifier modules are already fixed on main cabinet, as shown in below figure (system configured capacity is 90A, it consists of 3 rectifier modules (VRM4830) and 1 monitoring module (NVSM-A)).

Main cabinet of power system NVRM4890 (view from front)



- |                                    |                           |
|------------------------------------|---------------------------|
| 1. AC input socket with three-core | 2. Fixing hole            |
| 3. MCB                             | 4. Power module (VRM4830) |
| 5. Load output connectors          | 6. Monitoring module      |

### 3.1 Electric connection between and main cabinet and external component

#### 3.1.1 Electric connection

1) Chassis connects with external electric through system interface board. As shown in figure below:

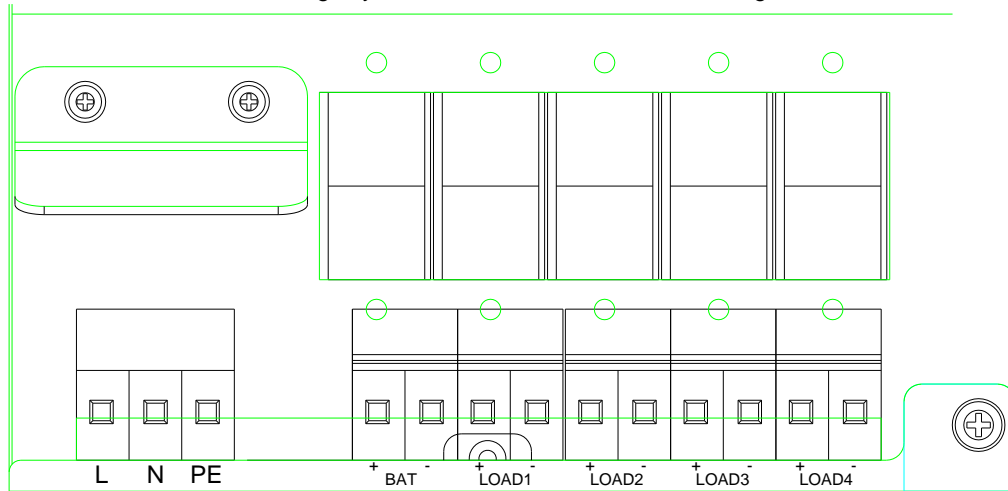


Illustration of system interface board of NVRM4890

Connector definitions are as below:

- (1) L, N, PE are AC input terminals.
- (2) LOAD (+) is positive pole and LOAD (-) is negative pole of load;
- (3) BAT (+) and BAT (-) are battery connectors

#### 3.1.2 Process of electric connections

Electric connection between and main cabinet and external component includes: connection of AC input line, connection of DC output and battery, connection of communication cables, connection of GND cables. The main requirements of electrical connection are safety and reliability. The followings are detailed description.

##### (1) AC input cable connections

The connectors for AC input cable are three-core AC input sockets on the front panel of system. The AC cable can be directly inserted to the connector.

##### **Note:**

1. **AC input line is high voltage operating line. Be sure that the AC input is cut off before implementing any operations. Warning signs shall be tagged to the switches that should not be touched during operating process.**
2. **AC circuit terminals and other unnecessarily bare part shall be strictly insulated.**
3. **There shall be GND before power on.**

## **System Specifications**

(2) DC cables connections

A. Connection of load cables

The load connection terminals of power system are LOAD1, LOAD2, LOAD3, and LOAD4 which locate on the front panel of the system. The cable can be directly inserted to the connector.

- a. The specifications and model of the cables shall be according to the engineering design requirements.
- b. Connect the “+” end of the load to the corresponding connection terminal of LOAD“+”.
- c. Connect the “-”end of the load to the corresponding connection terminal of LOAD“-”.

B. Connection of battery cables

Connection terminal of system and battery is of 2PIN- BAT+ and BAT-. The cable can be directly inserted to the connector. The detailed process of battery connection is as following:

- a. Prepare positive connection cables and negative connection cables (including terminals and polarity identifications ready) .
- b. Connect one end of positive connection cable to the BAT. “+” terminal;
- c. Connect one end of negative connection cable to the BAT. “-” terminal;

C Recommended cable specifications

Item	Sign	AWG/Min. section (#/mm <sup>2</sup> )	AWG / Max. section (#/mm <sup>2</sup> )	Temp class (°C)	Voltage Resistance (V)
Output positive wire	Lout1 、 Lout2 、 Lout1 Lout1	12#/4	10#/5.5	105	600
Output GND wire	GND	12#/4	10#5.5	105	600
Input GND wire	PE in	9#/6	6#/10	105	600
Mains neutral wire	N in	10#/5.5	6#/10	105	600
Mains live wire	Lin	10#/5.5	6#/10	105	600
Battery positive pole	( BATTERY + )	7#/8	6#/10	105	600
Battery negative pole	( BATTERY - )	7#/8	6#/10	105	600

(3) Connection of GND cables

PE connection: Connect the chassis GND terminal of system main cabinet and external GND bus bar with cable of 12mm<sup>2</sup> above.

(4) Connection of communication cables

RS-485-communication cable terminal of NVRM4890, locates on front panel of monitoring module, function as communication with the host.

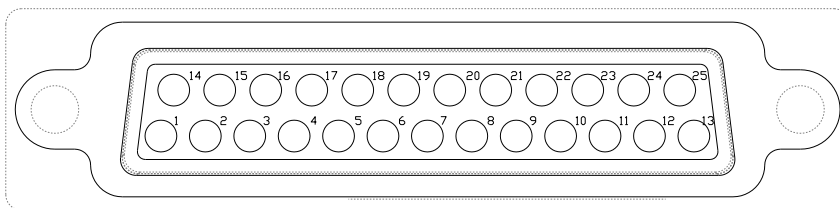
RS-485 communication mode:

- A. Connect one end of communication cable to RS-485 on front board of NVRM4890
- B. Connect the other end of communication cable to RS-485 of the host. “+”, “-” cable of RS485 in NVRM4890 respectively correspond to “+”, “-” cable of RS-485 in the host.

**System Specifications**

(5) COM signal

The COM signal interface of NVRM4890 is located on the front panel of the monitoring module.



SNO.	Pin	Assignment	Sequence	Pin	Assignment
1	12V+	12V power+	14	Null	
2	VDD	5V power+	15	Null	
3	GND	Power GND	16	B1-	Stand-by digital data input
4	OVT6-	Dry contact6 output-	17	OVT6+	Dry contact6 output +
5	OUT5-	Dry contact5 output-	18	OVT5+	Dry contact5 output +
6	OUT4-	Dry contact4 output-	19	OVT4+	Dry contact4 output +
7	OUT3-	Dry contact3 output-	20	OVT3+	Dry contact3 output +
8	OUT2-	Dry contact2 output-	21	OVT2+	Dry contact2 output +
9	OUT1-	Dry contact1 output-	22	OVT1+	Dry contact1 output +
10	BAT-TEMP-IN	Battery temperature input	23	HJ-SD-IN	Ambient Humidity input
11	HJ-TEMP-IN	Ambient temperature input	24	YW-IN	Smog sensor
12	MC-IN	Gate magnetic	25	SJ-IN	Water logging
13	B1+	Stand-by digital data input+			

Dry contact and corresponding output data:

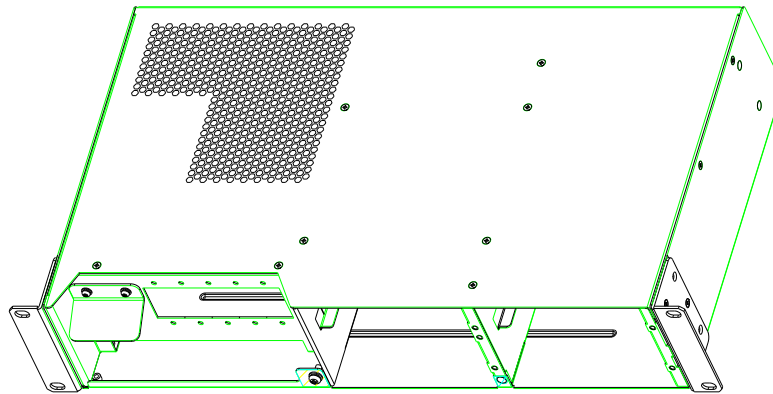
Dry contact	Output data
Contact1 output	System alarm
Contact2 output	High/low temperature alarm
Contact3 output	Gate magnetic alarm
Contact4 output	Smog alarm
Contact5 output	Water logging alarm
Contact6 output	AC power off alarm

### 3.2 Checking after installation

- (1) Check the stability of sub rack and each component.
- (2) Check the conformity of colors of Ac lines, the firmness of original wiring of rack and the completeness of safety identification of AC distribution. Check the consistency of AC wiring and wire application according to the design documents.
- (3) Check DC output and battery connectors, numbering, line sequence and polarity. Check the firmness of cable connection and reliable connection of bus bar. Re-check the polarity and sequence of battery connection.
- (4) All switches in position of disconnection.

### 4 Installation of rectifier and monitor

Fixing position of monitor and rectifier on the chassis are shown as bellow:



Location of each component on main chassis of NVRM4890

1. 3 pcs of slot of VRM4830
2. 1 pcs of slot of NVSM-A

Handles on panel of rectifier module and monitoring module are equipped. When inserting component into the main cabinet, the operator shall clutch the handle with one hand while holding it with the other hand. Slowly push the component into its slot until the connection terminal on back of the component inserted into corresponding socket of system bar in the main cabinet. Finally, finish the installation by firmly fixing the screw on the panel to the main cabinet.

When removing component from the main cabinet, first screw off the bolt on panel then slowly remove the component from its slot while clutching the handle.

**Note:**

**VRM4830 is hot-swappable, please make sure that all indicators on module panel is under state of off before the module is inserted.**

