

# OPTIMAL POWER<sup>®</sup>

**OPR Power Series™**  
AC to DC POWER SUPPLY SERIES WITH REMOTE MANAGEMENT AND  
ALARM SYSTEMS

**Model Nos. OPR100-48S / OPR100-48R**

Manual

Revision F

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Optimal Power Supplies LLC  
[www.optimal-power.com](http://www.optimal-power.com)

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## **LIABILITY**

**DO NOT OPERATE OR SERVICE THE OPR100-48S & OPR100-48R MODELS WITHOUT READING THIS ENTIRE MANUAL FIRST**

Optimal Power Supplies LLC is not responsible for any kinds of damages sustained through the use of this or any other Optimal Power Supplies LLC products. It is entirely the customer's responsibility to take all the necessary precautionary measures when installing this unit.

In the interest of improving internal design, operational function, and/or reliability, Optimal Power Supplies LLC reserves the right to make changes to the products described in this document without notice.

## **WARRANTY**

Optimal Power warrants all of its products against defects in materials and workmanship for one year from date of delivery. We will repair, or replace parts which prove to be defective during the warranty period provided that:

1. A Return Maintenance Authorization (RMA) is obtained from OPTIMAL POWER at (251) 209-8088 or [www.optimal-power.com](http://www.optimal-power.com). Please reference your RMA number on the outside of the box the item is shipped in.
2. Shipping charges are pre-paid by customer

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# **Chapter 1**

## **OPR Power Series - Introduction**

### **1.1 Product Description**

OPR Power Series is a unique and a highly reliable power supply series. It can be configured as a single as well as a fully redundant power supply. OPR Power Series is designed for Universal AC to DC power supply applications. Because of this feature these power supplies can be used anywhere in the world. These power supplies are mainly used in the following applications:

- Computer Peripherals and Networking Applications
- Telecommunications and Fiber Optic Network
- Voice, Data and Analog Communications
- Universities and Educational Facilities
- Instrumentation and Electronics
- Utility and Power Industries
- Data Acquisition
- Medical
- Military

OPR Power Series is a reliable, efficient and inexpensive solution for all kind of AC to DC power supply applications.

### **1.2 Main Features:**

- Compact Rack Mount Size (1.75" H x 19" W x 12.12" D)
- Universal AC (Alternate Current) Input
- Filtered IEC AC Inlet Connectors
- Internal Power Bricks EMI FCC Class B Clearance
- Single and Multiple Output
- Highly Efficient Design
- 1U Low Profile Height
- NO Minimum Load Required
- Remote Management
- Low Voltage Power Supply Alarm
- Cost Effective and Reliable Power Supply Solution

### 1.3 General OPR Power Series Specifications:

Input Voltage.....	Universal 90VAC to 264VAC
Input Frequency.....	47Hz to 63Hz
Operational Temperature.....	0°C to 55°C
Storage Temperature.....	-20°C to 85°C
Cooling.....	Cool Air Flow
Overload Protection.....	Auto-Recovery
Efficiency.....	80-90% Typical
DC OK.....	DB25 Interface and Status LEDs

### 1.4 Typical Safety Rating for Internal Power Modules:

Designed in full compliance with.....	UL60950
	CSA 22.2 No. 234
	EN60950
EMI.....	EN55022 “Class B”
EMS.....	EN61000-4-2,-3,-4,-5,-6,-8,-11
Harmonics.....	EN61000-3-2 Class D



**Redundant Power Supply**

## Chapter 2

### OPR100-48S / OPR100-48R

#### 2.1 OPR100-48S / OPR100-48R Description:

The Models OPR100-48S and OPR100-48R are 1U rack mountable power supplies designed to operate in single and redundant power configurations respectively. OPR100-48S has one built-in universal AC to 48V DC power supply, and OPR100-48R has two built-in universal AC to 48V DC power supplies with two IEC AC plugs for complete redundancy. OPR100-48S provides up to 100W of power, and OPR100-48R provides up to 200W of redundant power\* to the system that each is attached. Each model has its own AC-INLET (one for OPR100-48S and two for OPR100-48R), ON/OFF switches, and power LEDs (one for OPR100-48S and two for OPR100-48R). Both models have two built-in alarm circuits with red LEDs for low DC power monitoring and for remote power management. In addition, models OPR100-48S and OPR100-48R have a DB25 interface for power supply alarm and remote Turn-OFF features.

#### 2.2 Specifications:

##### Electrical

Output Voltage	48V DC
Output Ripple	Typical 200 mV
Output Current	2.3A Typical
Output Power	200W for OPR100-48R* 100W for OPR100-48S
Input Voltage	Universal 90VAC to 264VAC input (2 AC inlet plugs in OPR100-48R for complete redundancy)
Input Frequency	47Hz to 63Hz
Input Current	3 Amps max
Current Tolerance	1%
Remote Management Interface	DB25 Logic Interface

Note\*: 200W is intended only for redundancy; it is not recommended to power a total load of 200W with the Model OPR100-48R

##### Typical Safety Ratings for Internal Modules:

Designed in full compliance with	UL60950 CSA 22.2 No. 234 EN60950
EMI	EN55022 "Class B"
EMS	EN61000-4-2,-3,-4,-5,-6,-8,-11
Harmonics	EN61000-3-2 Class D

## Environmental

Overload Protection	Auto-recovery
Functional Temperature	0 to 70 °C
Storage Temperature	-20 to 85 °C
Over voltage Type	Latch off
Efficiency	80-90% Typical

## Physical

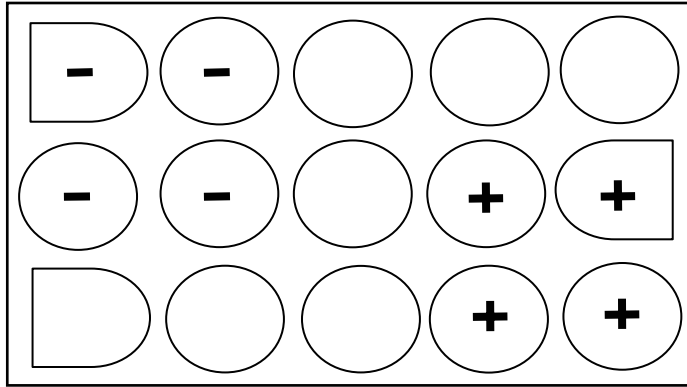
Dimensions	1U (1.75" H x 19" W x 12.12" D)
Weight	Approx. 13.25 lb = 6.01 kg = 212 oz



**Single Power Supply**

### Status Indicators and Back Panel Connections

#### 3.1 Back Panel DC Power Connector



**WARNING: Observe polarity when making connection to the rear of Model OPR100-48S / Model OPR100-48R**

- + Indicates 48 Volt DC
- Indicates Ground Line

#### 3.2 Front Panel Status Indicators

LED	Description (When Lit)	Labeled Indicators
Solid Green	Power Supply 1 Activated	Power 1
Solid Red	Power Supply Failure	PS 1 Alarm
Solid Green	Power Supply 2 Activated	Power 2
Solid Red	Power Supply Failure	PS 2 Alarm

#### 3.3 Remote Management DB25 Pin-Out for OPR100-48S

Pin Numbers	Description	I/O Direction	Logic High = 1	Logic Low = 0
Pin # 2	Remote Turn ON/OFF	Input	Power OFF <sup>1</sup>	Power ON
Pin # 3	Power Supply Alarm	+RS485 Output	Alarm	NO-Alarm
Pin # 16	Power Supply Alarm	-RS485 Output	NO-Alarm	Alarm
Pin # 1	Frame Ground	Output	NA	NA
Pin # 7	Signal Ground <sup>2</sup>	Output	NA	NA

#### 3.4 Remote Management DB25 Pin-Out for OPR100-48R

Pin Numbers	Description	I/O Direction	Logic High = 1	Logic Low = 0
Pin # 3	Power Supply 1 Alarm	+RS485 Output	Alarm	NO-Alarm
Pin # 16	Power Supply 1 Alarm	-RS485 Output	NO-Alarm	Alarm
Pin # 9	Power Supply 2 Alarm	-RS485 Output	NO-Alarm	Alarm
Pin # 17	Power Supply 2 Alarm	+RS485 Output	Alarm	NO-Alarm
Pin # 1	Frame Ground	Output	NA	NA
Pin # 7	Signal Ground <sup>2</sup>	Output	NA	NA

**Note 1:** In order to turn OFF the power supply remotely, a voltage level of 5V@80mA current should be applied between pin 2 and pin 7.

**Note 2:** For proper remote management interface functionality. It is important to connect the signal ground properly and securely.



**Alarm Systems**

**4.1 Alarm Monitoring System**

The models OPR100-48S and OPR100-48R have the ability to monitor output DC voltage, and trigger an alarm when the output DC voltage starts to decrease below the threshold limit. The threshold limit of the system is 40V.

**OPR100-48S Alarm Indications**

If for some reason the voltages in power supply Model OPR100-48S drop below the threshold limit (due to overload, for example) the DB25 interface pin 16 will go logic LOW, and pin 3 will have logic HIGH indicating power supply failure.

DB25 Pin Out	Normal Condition		Power Supply Failure	
Pin 16 (Power Supply Alarm)	Logic High = 1	↑	Logic Low = 0	↓
Pin 3 (Power Supply Alarm)	Logic Low = 0	↓	Logic High = 1	↑

**OPR100-48R Alarm Indications**

If for some reason the voltages of power supply 1 in the Model OPR100-48R drop below the threshold limit (due to overload, for example) the DB25 interface pins 3 will go logic HIGH, and pin 16 will have logic LOW indicating power supply 1 failure.

DB25 Pin Out	Normal Condition		Power Supply Failure	
Pin 3 (Power Supply 1 Alarm)	Logic Low = 0	↓	Logic High = 1	↑
Pin 16 (Power Supply 1 Alarm)	Logic High = 1	↑	Logic Low = 0	↓

Furthermore, if the voltages of power supply 2 drop below the threshold limit. The interface pin 17 will go logic HIGH, and pin 9 will have logic LOW indicating power supply 2 failure.

DB25 Pin Out	Normal Condition		Power Supply Failure	
Pin 17 (Power Supply 2 Alarm)	Logic Low = 0	↓	Logic High = 1	↑
Pin 9 (Power Supply 2 Alarm)	Logic High = 1	↑	Logic Low = 0	↓

## **Chapter 5**

### **Installation and Maintenance**

#### **5.1 Installation**

OPR100-48S and OPR100-48R may be installed in a fixed, semi-fixed and mobile environments that meet the environmental characteristics specified in Chapter 2. These models are designed to be mounted in a standard 19" equipment rack utilizing the mounting holes provided on the front of each unit. **It is recommended that at least 1 rack unit (1U = 1.75") gap be provided above or below the OPR power supply unit for proper air flow.**

Once these power supplies are mounted in the rack, they should be connected to the system (that only requires 48VDC power) with the DC output connector located at the rear of the OPR unit.

**WARNING: Observe polarity when making connection to the rear of model OPR100-48S / OPR100-48R**

- Next, ensure that the front panel power switch(es) are in "OFF" position.
- Connect the AC power cord to the unit by plugging the free end of the power cord into a standard three prong AC outlet.
- Ensure that the AC power plug(s) located at the rear end of the power supply are connected to a clean and well-grounded Universal AC source.

#### **OPR100-48S Setup**

Once all the wires are connected properly as described in the above installation paragraph:

- (1) Turn "ON" the front panel switch.
- (2) The "Power" LEDs, should light up.

Now the system is ready to operate to its required purpose.

#### **OPR100-48R Setup**

Once all the wires are connected properly as described in the above installation paragraph:

- (1) Turn "ON" the front panel switch for Power supply 1

The "Power 1" green LED, and "PS 2 Alarm" red LED should light up. Indicating Power supply 1 is "ON" and Power supply 2 is "OFF"

- (2) Turn "ON" the front panel switch for Power supply 2

This should clear the "PS 2 Alarm" red LED and cause the "Power 2" green LED to illuminate.

Now the system is ready to operate to its required purpose.

## Monitoring AC Input and DC Output

OPR Series models have switches that monitor AC current input and DC current output. Whenever the "Power" switches are "ON" the LEDs embedded in the switch should light up. These indicate good AC input. Similarly the "Power 1" (or "Power1" and "Power2" in redundant models) LEDs should turn green, indicating good DC output.

### **Alarm Conditions for Redundant Power Supply**

- Power 1 Failure
- AC plug disconnected to Power 1
- Front panel Switch to Power 1 is in "OFF" position
- Power 2 Failure
- AC Plug disconnected to Power 2
- Front panel Switch to Power 2 is in "OFF" position

## 5.2 Maintenance

The Models OPR100-48S and OPR100-48R should be treated with the sufficient care.

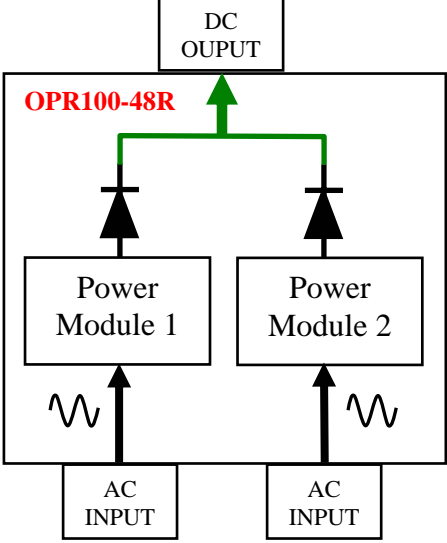
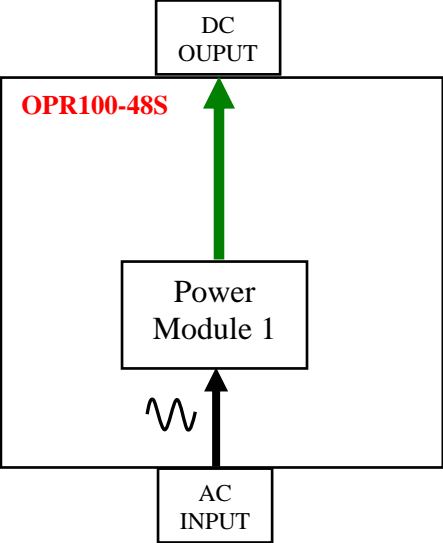
- Do not use abrasives or solvents, as they may mar surfaces
- Do not subject the unit to excessive temperature extremes
- Do not subject the unit to excessive moisture or spilled liquids
- Do not subject the unit to sudden or severe shocks
- Never operate the Model OPR100-48S / OPR100-48R with any of the covers removed

## 5.3 Warnings

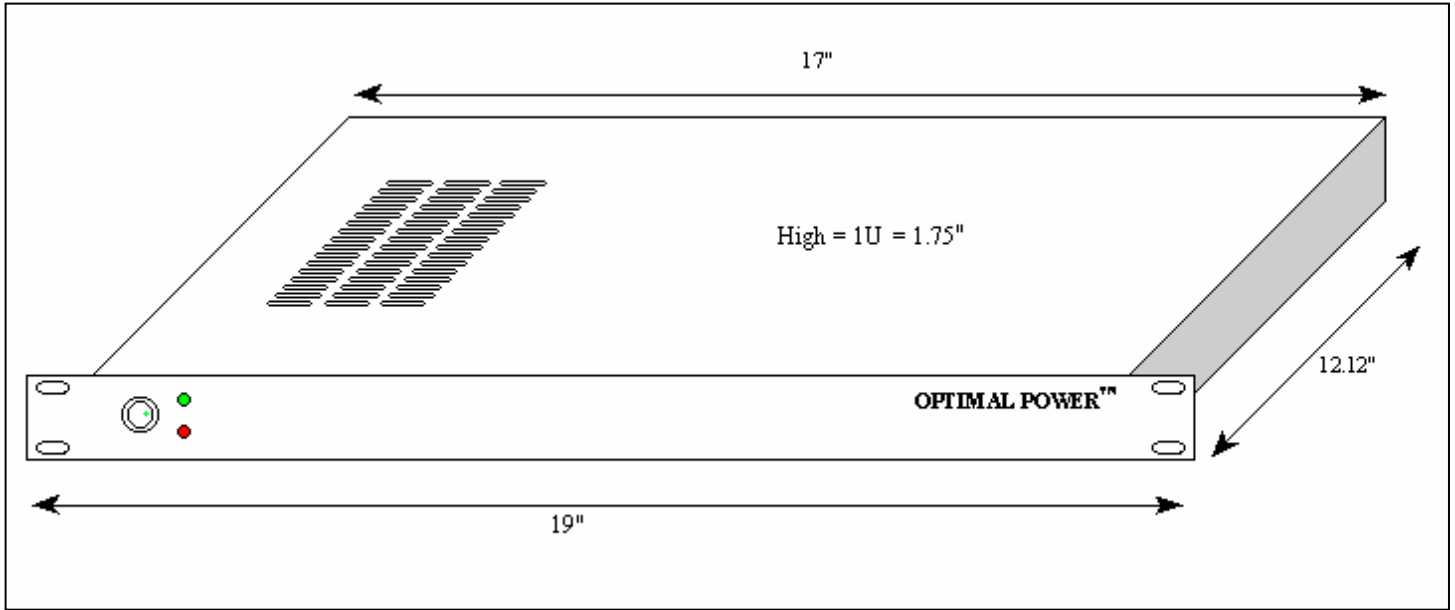
To reduce the risk of fire, electric shock or product damage, **DO NOT** expose the OPR100-48S / OPR100-48R unit(s) to direct heat, rain, moisture, dripping or splashing. **DO NOT** place any object filled with any kinds of liquids on the unit(s). To prevent damage to LEDs and switches, **DO NOT** place the front panel of the unit face down, and/or **DO NOT** press against the front panel.

**Optimal Power is not responsible for any kinds of damages sustained through the use of this product.**

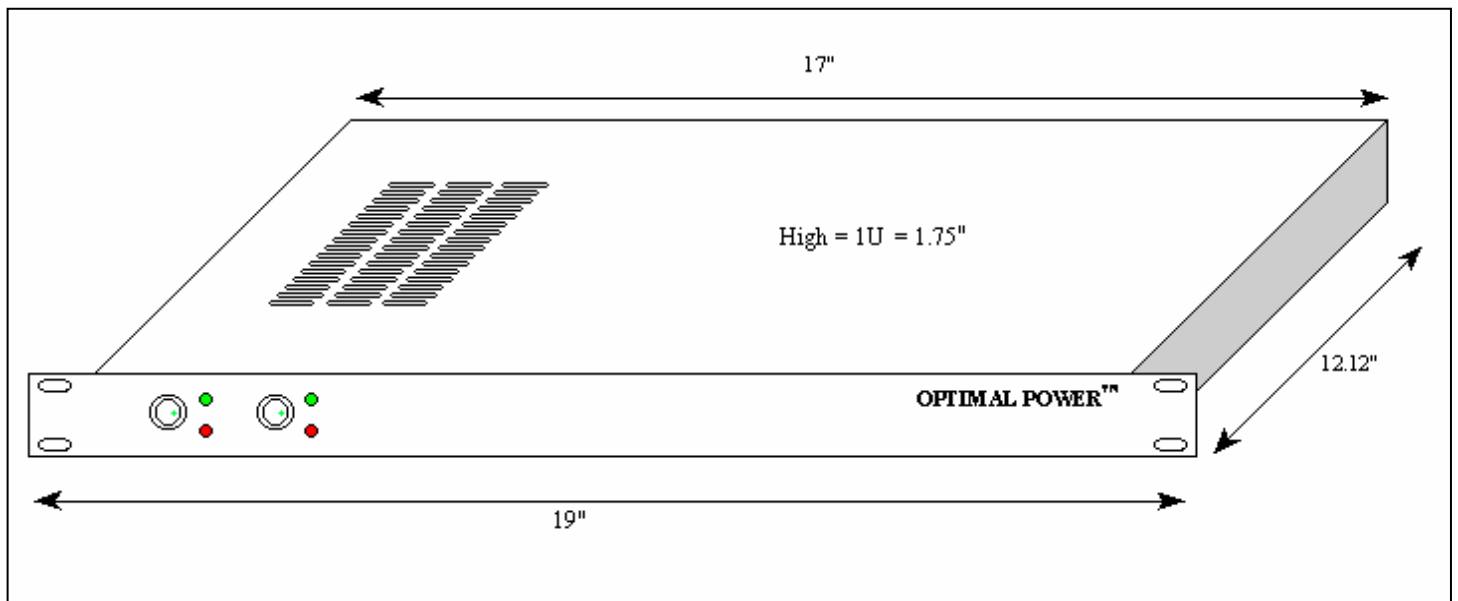
### 5.4 Design Block Diagram



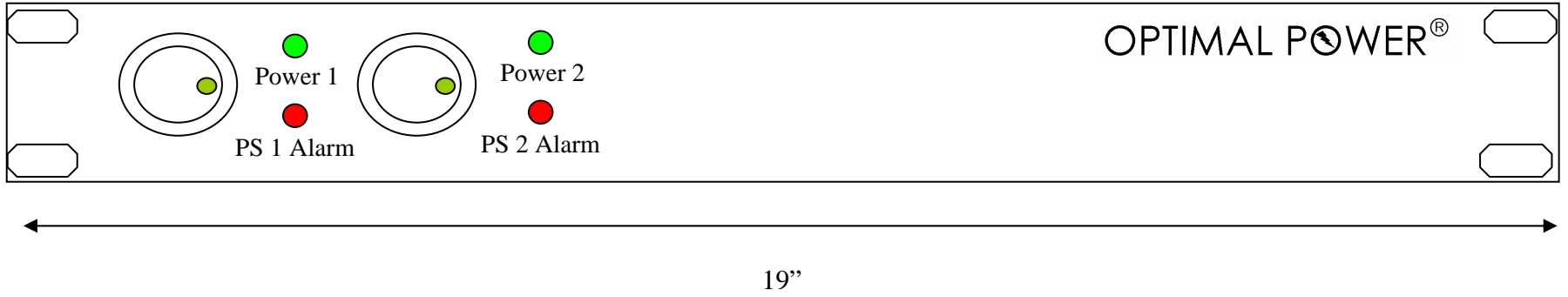
**6.1 OPR100-48S (Single Power Supply)**



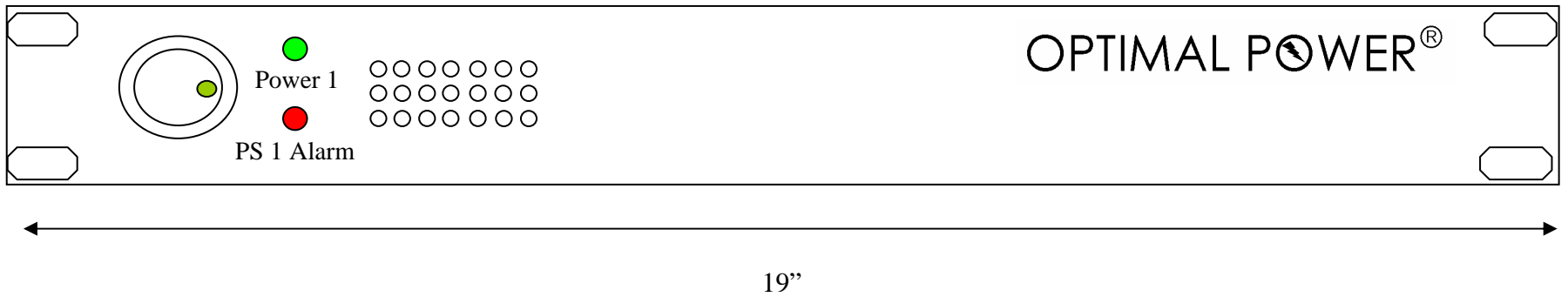
**6.2 OPR100-48R (Redundant Power Supply)**



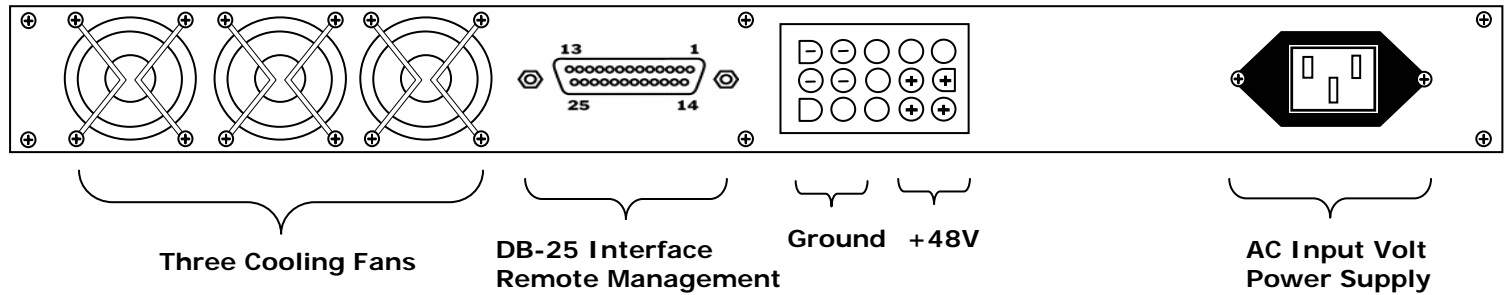
**6.3 OPR100-48R (Front View)**



**6.4 OPR100-48S (Front View)**

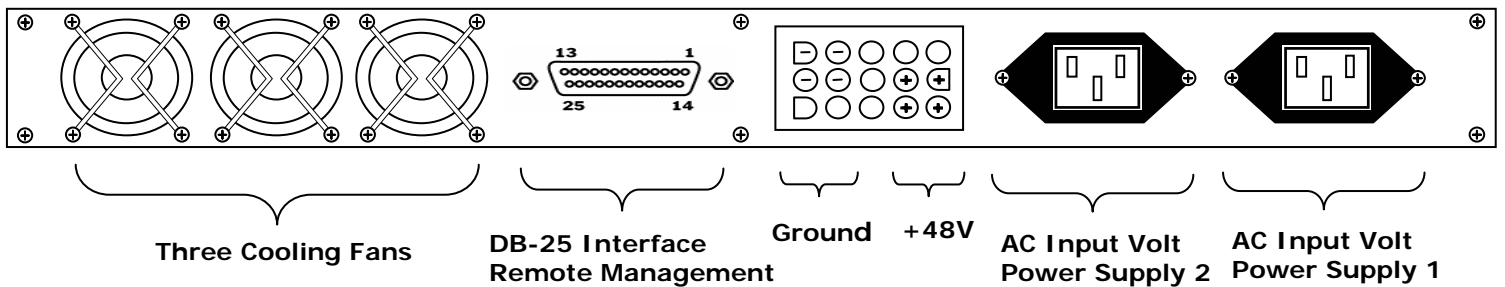


## 6.5 OPR100-48S (Rear View)



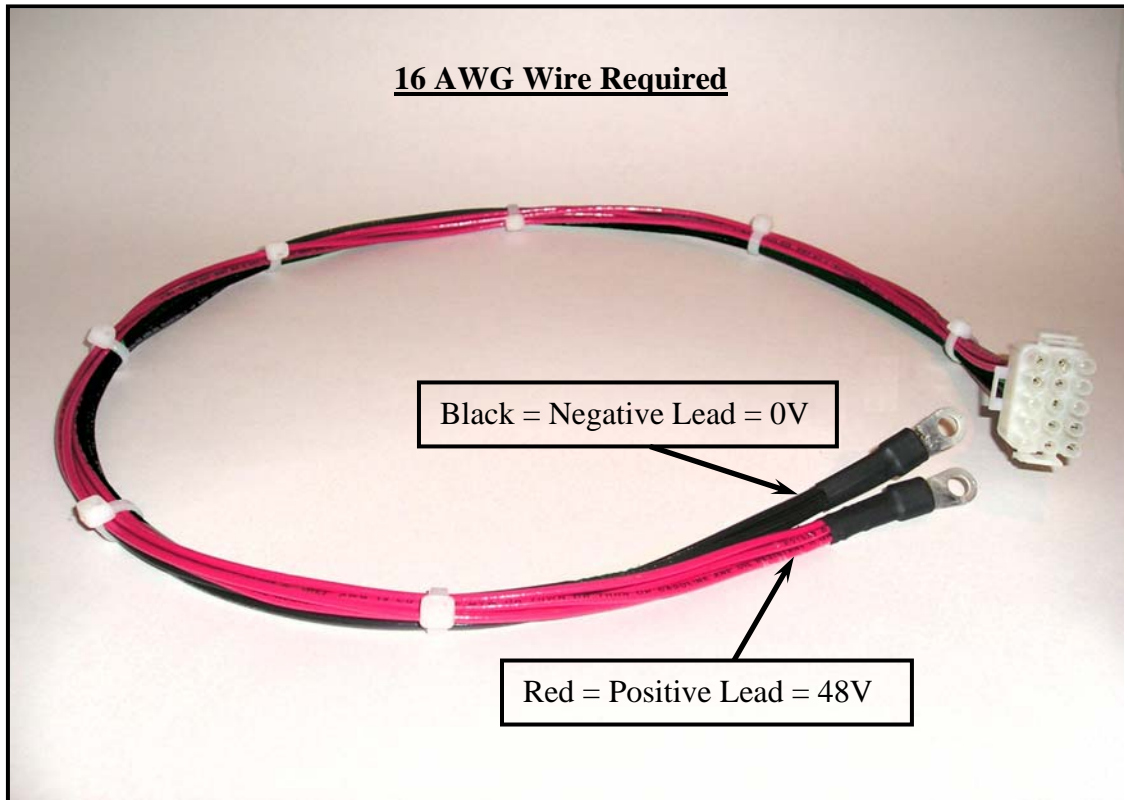
Pin 1 = Frame Ground  
 Pin 2 = Remote ON/OFF  
 Pin 3 = +RS485 Power Alarm  
 Pin 7 = Signal Ground  
 Pin 16 = -RS485 Power Alarm

## 6.6 OPR100-48R (Rear View)

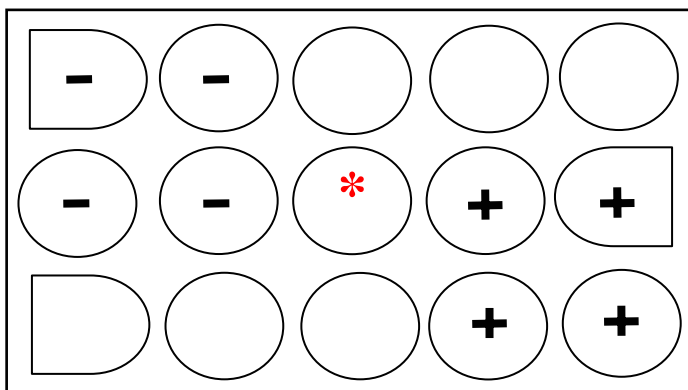


Pin 1 = Frame Ground  
 Pin 3 = +RS485 (Power 1 Alarm)  
 Pin 16 = -RS485 (Power 1 Alarm)  
 Pin 17 = +RS485 (Power 2 Alarm)  
 Pin 9 = -RS485 (Power 2 Alarm)  
 Pin 7 = Signal Ground

## 6.7 DC Cable Image



**Important Note\*** For proper current flow make sure to connect all the specified power terminals



**WARNING:** Observe polarity when making connection to the rear of Model OPR100-48S / Model OPR100-48R

+ Indicates 48 Volt DC  
- Indicates Ground Line