

OPTIMAL POWER[®]

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

Model Nos. OPR200-05S / OPR200-05R

Manual

Revision E

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Optimal Power Supplies LLC
www.optimal-power.com

PROPRIETARY DATA

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LIABILITY

DO NOT OPERATE OR SERVICE THE OPR200-05S & OPR200-05R MODELS WITHOUT READING THIS ENTIRE MANUAL FIRST

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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.

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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

OPR200-05S / OPR200-05R

2.1 OPR200-05S / OPR200-05R Description:

The Models OPR200-05S and OPR200-05R are 1U rack mountable power supplies designed to operate in single and redundant power configurations respectively. OPR200-05S has one built-in universal AC to 5V DC power supply, and OPR200-05R has two built-in universal AC to 5V DC power supplies with two IEC AC plugs for complete redundancy. OPR200-05S provides up to 200W of power, and OPR200-05R provides up to 400W of redundant power* to the system that each is attached. Each model has its own AC-INLET (one for OPR200-05S and two for OPR200-05R for redundancy), ON/OFF switches, and power LEDs (one for OPR200-05S and two for OPR200-05R). Both models have two built-in alarm circuits with red LEDs for low DC power monitoring and for remote power management. In addition, models OPR200-05S and OPR200-05R have Logic Interface for power supply alarm circuit.

2.2 Specifications:

Electrical

| | |
|-----------------------------|--|
| Output Voltage | +5V DC |
| Output Ripple | Typical 50 mV |
| Output Current | 36A Typical |
| Output Power | 400W for OPR200-05R* 200W for OPR200-05S |
| Input Voltage | Universal 90VAC to 264VAC input (2 AC inlet plugs in OPR200-05R for complete redundancy) |
| Input Frequency | 47Hz to 63Hz |
| Input Current | 5 Amps max |
| Remote Management Interface | RS485 |

Note*: 400W is intended only for redundancy; it is not recommended to power a total load of 400W with the Model OPR200-05R

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

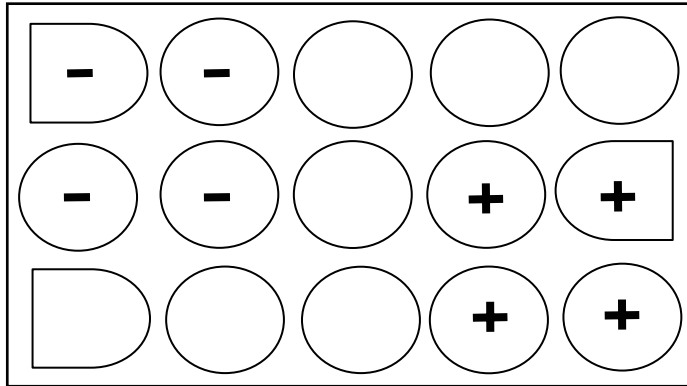
| | |
|------------|-------------------------------------|
| Dimensions | 1U (1.75" H x 19" W x 12.12" D) |
| Weight | Approx. 13.25 lb = 6.01 kg = 212 oz |



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 OPR200-05S / Model OPR200-05R

+ Indicates 5 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 OPR200-05S

| Pin Numbers | Description | I/O Direction | Logic High = 1 | Logic Low = 0 |
|-------------|----------------------------|---------------|----------------|---------------|
| Pin # 3 | Power Supply Alarm | +RS485Output | Alarm | No Alarm |
| Pin # 16 | Power Supply Alarm | -RS485 Output | No Alarm | Alarm |
| Pin # 1 | Frame Ground | Output | NA | NA |
| Pin # 7 | Signal Ground ¹ | Output | NA | NA |

3.4 Remote Management DB25 Pin Out for OPR200-05R

| Pin Numbers | Description | I/O Direction | Logic High = 1 | Logic Low = 0 |
|-------------|----------------------------|---------------|----------------|---------------|
| Pin # 3 | Power Supply 1 Alarm | +RS485Output | Alarm | No Alarm |
| Pin # 16 | Power Supply 1 Alarm | -RS485 Output | No Alarm | Alarm |
| Pin # 9 | Power Supply 2 Alarm | -RS485Output | 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 ¹ | Output | NA | NA |

Note 1: For proper remote management interface functionality. It is importance to connect the signal ground properly and securely.

4.1 Alarm Monitoring System

The Models OPR200-05S and OPR200-05R 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 power supply models have a threshold limit of 4V DC.

OPR200-05S Alarm Indications

If for some reason the voltages in power supply Model OPR200-05S 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 | ↑ |

OPR200-05R Alarm Indications

If for some reason the voltages of power supply 1 in the Model OPR200-05R 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

OPR200-05S and OPR200-05R 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 5V DC 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 OPR200-05S / OPR200-05R

- 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.

OPR200-05S 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.

OPR200-05R 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 OPR200-05S and OPR200-05R should be treated with the sufficient care.

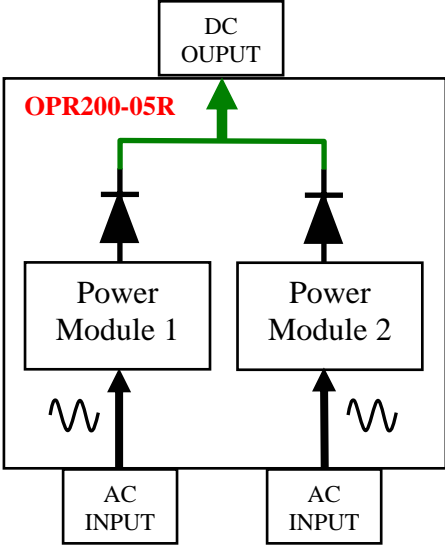
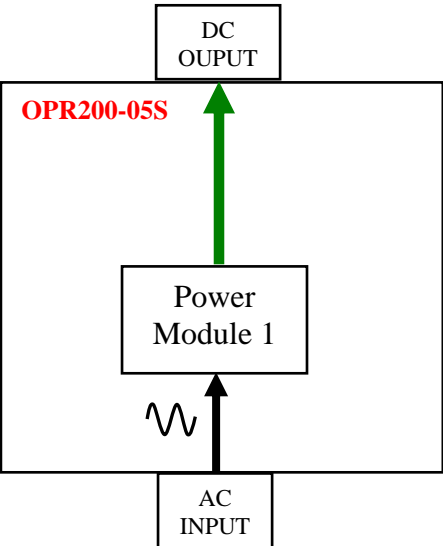
- Do not use abrasives or solvents, as they may mar surfaces
- Do not subject the unit to excessive temperature extremes
- Do not subject the unit to excessive moisture or spilled liquids
- Do not subject the unit to sudden or severe shocks
- Never operate the Model OPR200-05S / OPR200-05R with any of the covers removed

5.3 Warnings

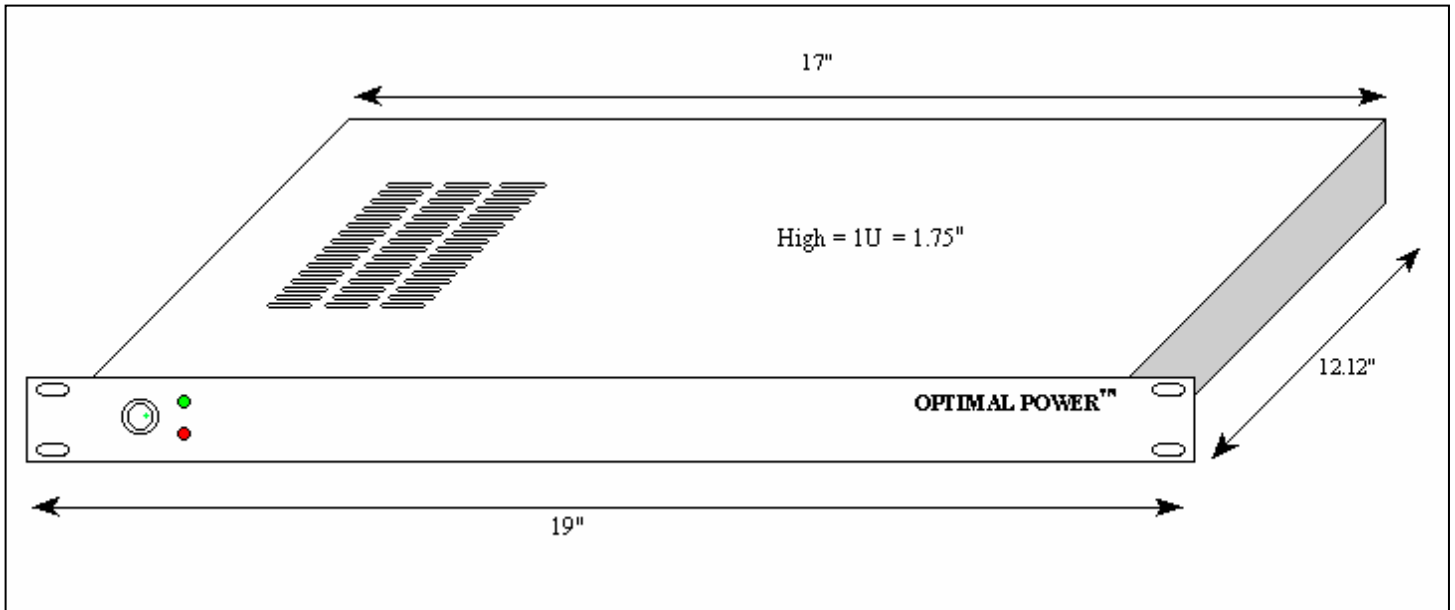
To reduce the risk of fire, electric shock or product damage, **DO NOT** expose the OPR200-05S / OPR200-05R unit(s) to direct heat, rain, moisture, dripping or splashing. **DO NOT** place any object filled with any kinds of liquids on the unit(s). To prevent damage to LEDs and switches, **DO NOT** place 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.

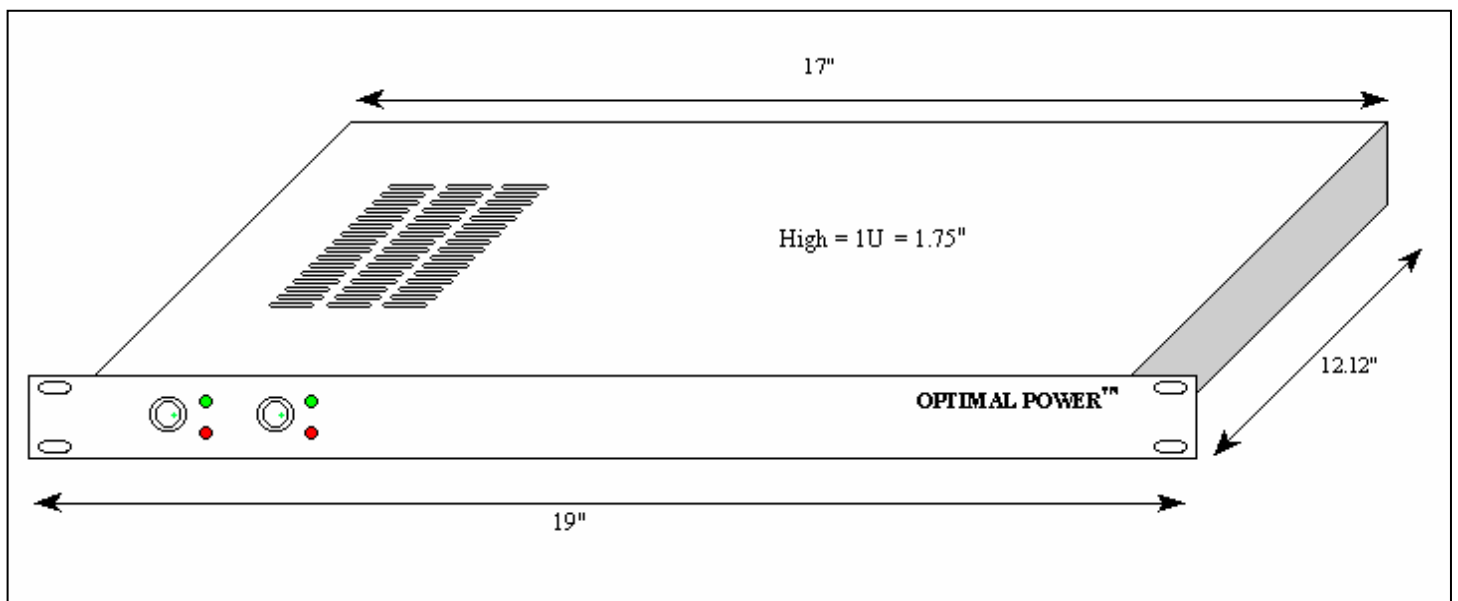
5.4 Design Block Diagram



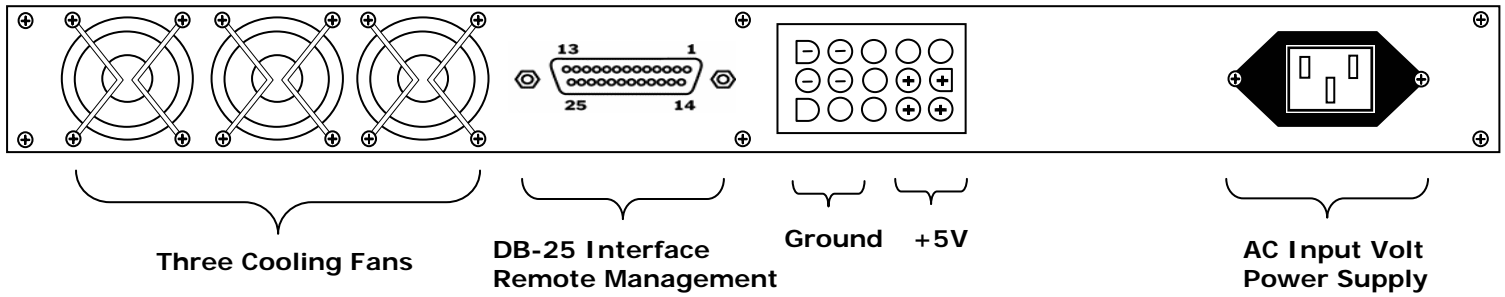
6.1 OPR200-05S (Single Power Supply)



6.2 OPR200-05R (Redundant Power Supply)

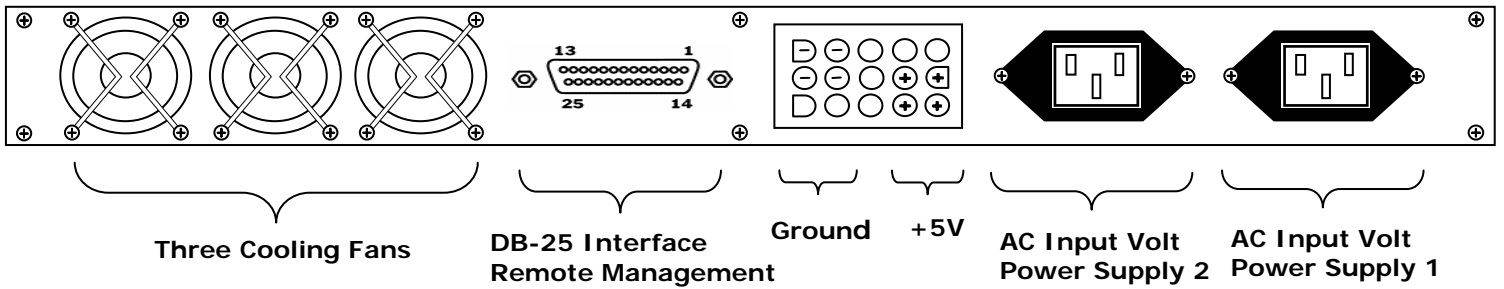


6.5 OPR200-05S (Rear View)



Pin 1 = Frame Ground
 Pin 3 = Power Alarm
 Pin 7 = Signal Ground
 Pin 16 = Power Alarm

6.6 OPR200-05R (Rear View)

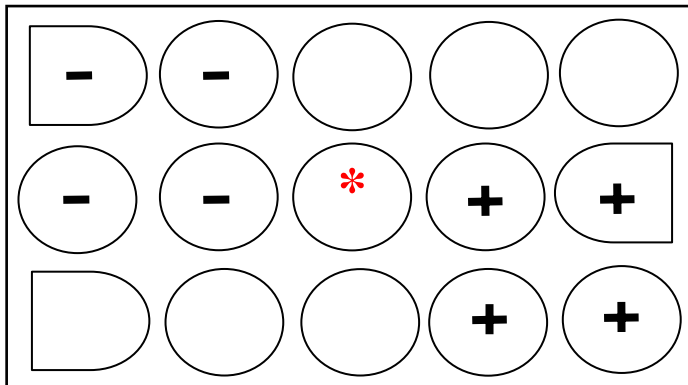


Pin 1 = Frame Ground
 Pin 3 = Power 1 Alarm
 Pin 16 = Power 1 Alarm
 Pin 9 = Power 2 Alarm
 Pin 17 = Power 2 Alarm
 Pin 7 = Signal Ground

6.7 DC Cable Image



Important Note* For proper current flow make sure to connect all the specified power terminals. The DC cable comes with the power supply unit.



WARNING: Observe polarity when making connection to the rear of Model OPR200-05S / Model OPR200-05R

+ Indicates 5 Volt DC
- Indicates Ground Line