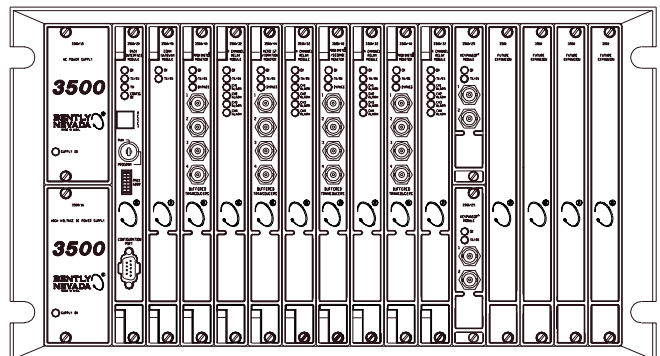


3500/15 AC AND DC POWER SUPPLIES

OPERATION AND MAINTENANCE MANUAL



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The following ways of contacting Bently Nevada LLC are provided for those times when you cannot contact your local Bently Nevada representative:

Mailing Address	1631 Bently Parkway South Minden, NV 89423 USA
Telephone	1 775 782 3611 1 800 227 5514
Fax	1 775 782 9259
Internet	www.bently.com

Additional Information

Note:

This manual does not contain all the information required to operate and maintain the AC and DC Power Supplies. Refer to the following manuals for other required information.

3500 Monitoring System Rack Installation and Maintenance Manual (129766-01)

- general description of a standard system
- general description of a Triple Modular redundant (TMR) system
- instructions for installing and removing the module from a 3500 rack
- drawings for all cables used in the 3500 Monitoring System

3500 Monitoring System Rack Configuration and Utilities Guide (129777-01)

- guidelines for using the 3500 Rack Configuration software for setting the operating parameters of the module
- guidelines for using the 3500 test utilities to verify that the input and output terminals on the module are operating properly

3500 Monitoring System Computer Hardware and Software Manual (128158-01)

- instructions for connecting the rack to a 3500 host computer
- procedures for verifying communication
- procedures for installing software
- guidelines for using Data Acquisition / DDE Server and Operator Display Software
- procedures and diagrams for setting up network and remote communications

3500 Field Wiring Diagram Package (130432-01)

- diagrams that show how to hook up a particular transducer
- lists of recommended wiring

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1 Receiving and Handling Instructions

1.1 Receiving Inspection

Visually inspect the module for obvious shipping damage. If shipping damage is apparent, file a claim with the carrier and submit a copy to Bently Nevada Corporation.

1.2 Handling and Storing Considerations

Circuit boards contain devices that are susceptible to damage when exposed to electrostatic charges. Damage caused by obvious mishandling of the board will void the warranty. To avoid damage, observe the following precautions in the order given.

Application Alert

Machinery protection may be lost when this module is removed from the rack.

- Do not discharge static electricity onto the circuit board. Avoid tools or procedures that would subject the circuit board to static damage. Some possible causes include ungrounded soldering irons, nonconductive plastics, and similar materials.
- Personnel must be grounded with a suitable grounding strap (such as 3M Velostat No. 2060) before handling or maintaining a printed circuit board.
- Transport and store circuit boards in electrically conductive bags or foil.
- Use extra caution during dry weather. Relative humidity less than 30% tends to multiply the accumulation of static charges on any surface.
- When performed properly, this module may be installed into or removed from the rack while power is applied to the rack. Refer to the Rack Installation and Maintenance Manual (part number 129766-01) for the proper procedure.

1.3 Disposal Statement

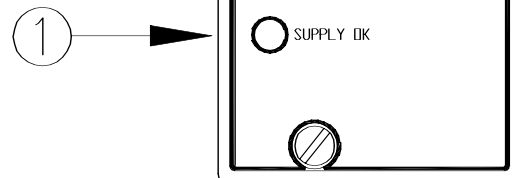
Customer and third parties that are in control of product at the end of its life or at the end of its use are solely responsible for proper disposal of product. No person, firm, corporation, association or agency that is in control of product shall dispose of it in a manner that is in violation of United States state laws, United States federal laws, or any applicable international law. Bently Nevada Corporation is not responsible for disposal of product at the end of its life or at the end of its use.

2 General Information

The 3500 Power Supplies are half-height modules and must be installed in the specially designed slots at the left side of the rack. The 3500 rack can contain one or two power supplies (any combination of AC and DC). Either supply can power a full rack. If installed, the second supply acts as a backup for the primary supply. Removing or inserting a power supply module will not disrupt operation of the rack as long as a backup supply is installed.

The 3500 Power Supplies accept a wide range of input voltages and converts them to voltages acceptable for use by other 3500 modules.

- 1) The Supply OK LED on the front of each power supply module indicates if all of the output voltages from that supply are within specification.



2.1 Power Supply Versions

Three Power Supply versions are available with the 3500 Monitoring System: the AC Power Supply, the High Voltage DC Power Supply, and the Low Voltage DC Power Supply.

The 3500 AC Power Supply accepts two ranges of AC input voltages by using two versions of the Power Input Module (PIM). The High Voltage AC PIM accepts inputs from 175 to 264 Vac rms. The Low Voltage AC PIM accepts inputs from 85 to 132 Vac rms.

The High Voltage DC supply supports DC inputs from 88 to 140 Vdc. The Low Voltage DC Supply supports DC inputs from 20 to 30 Vdc.

2.2 Single Power Supply

The 3500 will operate under fully loaded conditions with a single power supply. When a single power supply is used, it is recommended that the supply be located in the upper position.

2.3 Redundant Power Supplies

When two power supplies are installed in a rack, the supply in the lower slot acts as the primary supply and the supply in the upper slot acts as the backup supply. If the primary supply fails, the backup supply will provide power to the rack without interrupting rack operation.

Each supply provides power on an independent power distribution network. This ensures that any failure in one power distribution network (example: short in +5 volt supply) will not affect the second supply.

Note:

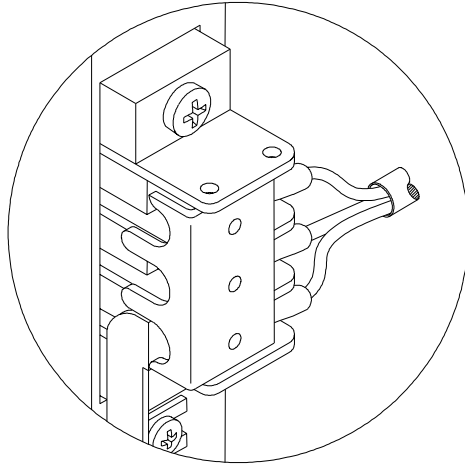
Redundant power supplies are required for Triple Modular Redundant (TMR) applications.

2.4 CE Compliance information

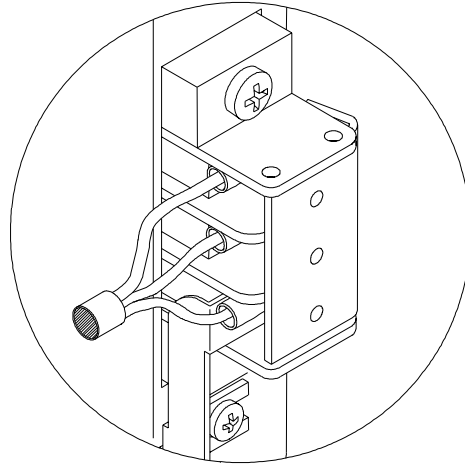
For systems installed in areas that require compliance to EN61000.3.2, the equipment shall only be used in industrial environment with a connection to the industrial power supply network. If the system is connected to the public power supply mains, EN61000.3.2 must be met by using a third party device that provides power factor correction.

2.5 Low Voltage Directive Compliance

To comply with EN 61010-01 Low Voltage Directive the PIM Connector Shield should be orientated properly. If the shield is not installed the same as the figure below carefully remove the shield and replace it in the correct orientation. Failure to correctly place the connector shield will make the power terminals accessible to an operator.



Connector Shield Standard Rack



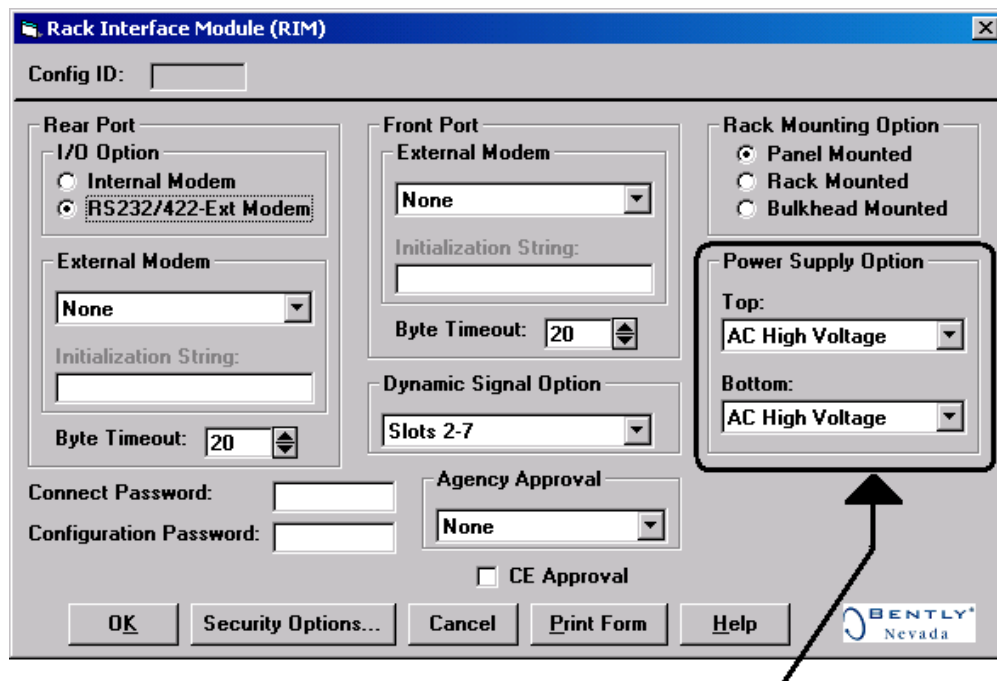
Connector Shield Bulkhead Rack

3 Configuration Information

The process of identifying the type of Power Supply and setting operating parameters is called configuration. To configure a Power Supply, use this section to gather configuration information, then use the Rack Configuration Software to set the options and download the settings to the rack. The Rack Configuration and Utilities Guide explains how to connect a computer to a rack and run the Rack Configuration Software.

3.1 Software Configuration Options

The Power Supply configuration field is on the option screen of the Rack Interface Module.



Any combination of the following Power Supply options can be used in the upper and lower slots of the rack:

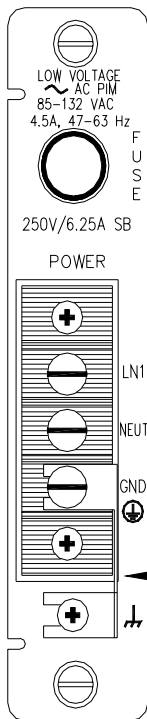
- None
- AC High Voltage
- AC Low Voltage
- DC High Voltage
- DC Low Voltage

4 Power Input Module Description

The Power Input Module is half-height and connects the power source to the Power Supply. Install the Power Input Module behind the Power Supply (in a Rack Mount or a Panel Mount rack) or above the Power Supply (in a Bulkhead rack). For example, if the Power Supply is installed in the upper slot then it's Power Input Module must be installed in the upper slot. Removing or inserting a Power Input Module will not disrupt operation of the 3500 rack as long as the other Power Supply and its associated Power Input Module are installed.

4.1 AC Power Input Module (Low Voltage version)

Use the AC Power Input Module (Low Voltage version) when the rack will be powered by low voltage AC (85 to 132 Vac, rms).



Refer to the 3500 Field Wiring Diagram Package for connecting the power to this Power Input Module.

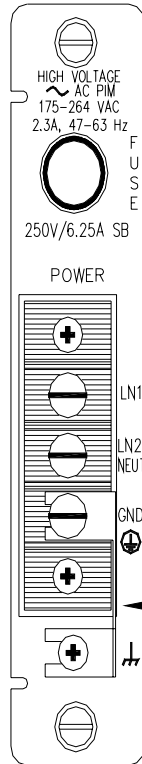


CAUTION

Proper rack chassis grounding requires that this metal strap remain connected. Failure to follow this warning could expose personnel to dangerously high voltage levels that could cause shock, burns, or death.

4.2 AC Power Input Module (High Voltage version)

Use the AC Power Input Module (High Voltage version) when the rack will be powered by high voltage AC (175 to 264 Vac, rms).



Refer to the 3500 Field Wiring Diagram Package for connecting the power to this Power Input Module.

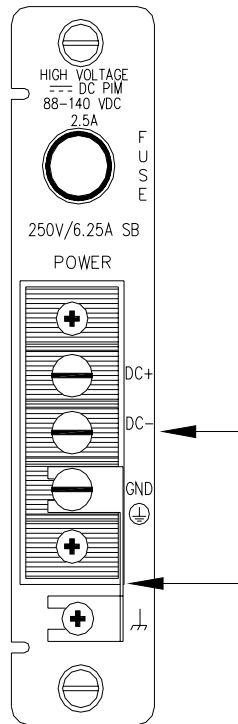


CAUTION

Proper rack chassis grounding requires that this metal strap remain connected. Failure to follow this warning could expose personnel to dangerously high voltage levels that could cause shock, burns, or death.

4.3 DC Power Input Module (High Voltage version)

Use the DC Power Input Module (High Voltage version) when the rack will be powered by high voltage DC (88 to 140 Vdc).



Refer to the 3500 Field Wiring Diagram Package for connecting the power to this Power Input Module.

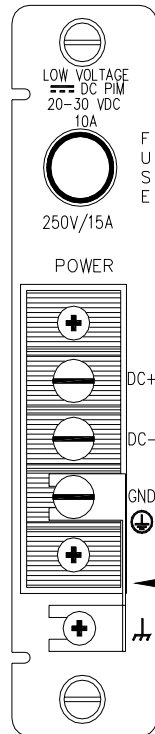


CAUTION

Proper rack chassis grounding requires that this metal strap remain connected. Failure to follow this warning could expose personnel to dangerously high voltage levels that could cause shock, burns, or death.

4.4 DC Power Input Module (Low Voltage version)

Use the DC Power Input Module (Low Voltage version) when the rack will be powered by low voltage DC (20 to 30 Vdc).



Refer to the 3500 Field Wiring Diagram Package for connecting the power to this Power Input Module.

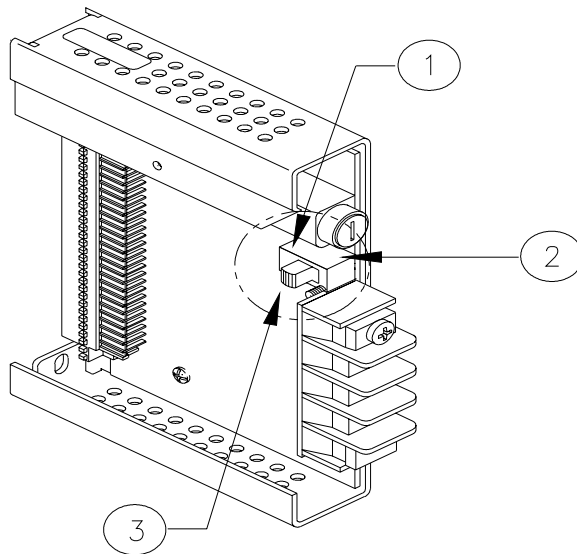


CAUTION

Proper rack chassis grounding requires that this metal strap remain connected. Failure to follow this warning could expose personnel to dangerously high voltage levels that could cause shock, burns, or death.

4.5 Connecting Single Point Ground

To avoid ground loops, the system must provide a single point ground. The Power Input Modules come with a switch that lets you control where the system is grounded. If two Power Supplies are installed then both switches need to be set to the same position. A CLOSED switch grounds the system through the GND terminal on the Terminal Strip connector. If the system is grounded at another location, such as when internal/external barriers are used, you need to be sure the switch is OPENED. The following figure and steps show how to set the switch to the desired position. For most racks the switch will be set to CLOSED at the factory; if Internal Barriers are installed at the factory the switch will be set to the OPENED position.



- 1) When the switch is pushed to this side the switch is in the CLOSED position.
- 2) When the switch is pushed to this side the switch is in the OPENED position.
- 3) Grounding switch. Depending on model, this switch could be located directly above or below the input connector.



CAUTION

High voltage may be present on the AC and DC Power Supplies for several minutes after removal from the rack.

Note:

For systems with internal/external barriers, refer to the 3500 Field Wiring Diagram Package for grounding requirements.

- 1) Remove the line cord protection cover from the Terminal Strip connector.
- 2) Remove the Phillips screw from the side. The screw holds the sheet metal cover on the Power Input Module.
- 3) Loosen the two screws that hold the Chassis ground clip. The screws are located below the Terminal Strip connector. Remove the Chassis ground clip.
- 4) While disengaging the sheet metal tab on the bottom of the sheet metal cover, slide the sheet metal cover over the Terminal Strip connector.
- 5) Slide the switch to the desired position.
- 6) Replace the cover and the Chassis ground clip on the Power Input Module.

5 Maintenance

This section shows how to verify that the Power Supplies and Power Input Modules are operating correctly.

When performed properly, this module may be removed from the rack while power is applied to the rack. Refer to the Rack Installation and Maintenance Manual (part number 129766-01) for the proper procedure.

If a problem is detected with a Power Supply or a Power Supply has been removed or installed, one of the following messages will be entered in the System Event List:

Message	Description
Supply OK / Installed	A Power Supply has been installed or a Power Supply has gone from a not OK condition to an OK condition.
Supply Faulted / Removed	A Power Supply has been removed or a Power Supply has gone not OK.

6 Troubleshooting

This section describes how to troubleshoot a problem with the Power Supply or the Power Input Module.



WARNING

AC LINE connected voltage is present. This voltage could cause shock, burns or death. Use proper isolation techniques.



WARNING

Power Supply shield may be hot when the rack is operating at elevated temperatures or under full load.



WARNING

High voltage may be present on the AC and DC Power Supplies for several minutes after removal from the rack.

6.1 LED Fault Conditions

If the Power Supply OK LED is off, check the following items:

- 1) Verify that the correct voltage is connected to the Power Input Module.
- 2) Verify that the installed Power Input Module matches the installed Power Supply. For example, an AC Power Input Module with the AC version of the Power Supply.
- 3) Check to see if the fuse on the Power Input Module has blown. If the fuse is blown, replace it. A blown fuse may be due to:
 - a) Severe over voltage on the Power Input Module.
 - b) A fault within the 3500 Power Supply.
- 4) If steps 1 through 3 do not solve the problem:
 - a) Install a new Power Supply. If the Power Supply OK LED comes on, the original Power Supply is faulty.
 - b) If the problem persists, the Power Input Module may be damaged. Contact Bently Nevada Corporation.

7 Ordering Information

Part number 3500/15 - ^A□□ - ^B□□ - ^C□□

- A** □□ **Power Supply Type (Top Slot)**
- 0 1 Low Voltage AC (85 to 132 Vac)
 - 0 2 High Voltage AC (175 to 264 Vac)
 - 0 3 High Voltage DC (88 to 140 Vdc)
 - 0 4 Low Voltage DC (20 to 30 Vdc)

- B** □□ **Power Supply Type (Bottom Slot)**
- 0 0 No supply (used when only one supply is required)
 - 0 1 Low Voltage AC (85 to 132 Vac)
 - 0 2 High Voltage AC (175 to 264 Vac)
 - 0 3 High Voltage DC (88 to 140 Vdc)
 - 0 4 Low Voltage DC (20 to 30 Vdc)

- C** □□ **Agency Approval Option**
- 0 0 None
 - 0 1 CSA-NRTL/C

Spares

AC Power Supply Module	127610-01
High Voltage AC Power Input Module (PIM)	125840-01
Low Voltage AC Power Input Module (PIM)	125840-02
Replacement Fuse (Both AC PIMs)	01720025
High Voltage DC Power Supply Module	129486-01
High Voltage DC Power Input Module (PIM)	129478-01
Replacement Fuse (High Voltage DC PIM)	01720025
Low Voltage DC Power Supply Module	133292-01
Low Voltage DC Power Input Module (PIM)	133300-01
Replacement Fuse (Low Voltage DC PIM)	01720045
Power Supply Module Manual	129767-01

8 Specifications

INPUTS

Low Voltage AC: Input: 85 to 132 Vac rms (120 to 188 Vac, pk)*
 Frequency: 47 to 63 Hertz.
 Input Current: 4.5 A rms Max
 Input Power: 194 W Max
 Efficiency: .8 min, typical
 Power Factor: .5 min, typical
 Volt-Amps 388 VA, Max

* Installations using AC Power Input Modules (PIM) prior to rev R and/or AC Power Supply Module prior to rev M require voltage input: 85 to 125 Vac rms

High Voltage AC: Input: 175 to 264 Vac rms (247 to 373 Vac, pk)**
 Frequency: 47 to 63 Hertz.
 Input Current: 2.3 A rms Max
 Input Power: 194 W Max
 Efficiency: .8 min, typical
 Power Factor: .5 min, typical
 Volt-Amps 388 VA, Max

** Installations using AC Power Input Modules (PIM) prior to rev R and/or AC Power Supply Module prior to rev M require voltage input: 175 to 250 Vac rms

Low Voltage DC: Input: 20-30 Vdc
 Input Current: 10 A Max
 Input Power: 194 W Max
 Efficiency: .8 min, typical

High Voltage DC: Input: 88-140 Vdc
 Input Current: 2.5 A Max
 Input Power: 194 W Max
 Efficiency: .8 min, typical

Out of Range Protection: For all power supply versions, an **undervoltage** will not harm either the supply or the PIM. However, an **overvoltage** will cause the fuse to open on the PIM.

Note:

Max input power = (max. output power)/(min efficiency)

Max volt-amps = (max input power)/(min power factor)

OUTPUTS

Front Panel LED's:

Supply OK LED: Indicates when the power supply is operating properly.

ENVIRONMENTAL LIMITS

Temperature: -30° C to 65° C (-22° F to 149° F) operating
-40° C to 85° C (-40° F to 185° F) storage

Humidity: 95 % non-condensing

CE MARK DIRECTIVES:

EMC Directives:

EN50081-2:

Radiated Emissions: EN 55011, Class A
Conducted Emissions: EN 55011, Class A

EN50082-2:

Electrostatic Discharge: EN 61000-4-2, Criteria B
Radiated Susceptibility: ENV 50140, Criteria A
Conducted Susceptibility: ENV 50141, Criteria A

Electrical Fast Transient: EN 61000-4-4, Criteria B
Surge Capability: EN 61000-4-5, Criteria B
Magnetic Field: EN 61000-4-8, Criteria A

Power Supply Dip: EN 61000-4-11, Criteria B
Radio Telephone: ENV 50204, Criteria B

Low Voltage Directives:

Safety Requirements: EN 61010-01

APPROVALS

CSA-NRTL/C: Class I, Division 2, Groups A through D

PHYSICAL

Power Supply Module:

Dimensions (Height x Width x Depth):

120.7 mm x 50.8 mm x 251.5 mm
(4.75 in x 2.0 in x 9.9 in)

Weight: 1.39 kg (3.06 lbs)

Power Input Modules:

Dimensions (Height x Width x Depth):

120.7 mm x 25.4 mm x 114.3 mm
(4.75 in x 1.0 in x 4.5 in)

Weight: 0.34 kg (0.75 lbs)

RACK SPACE REQUIREMENTS

Power Supply Module:

Two special half-height slots are located on the left side of the rack. Each slot accommodates one power supply. Both slots can be filled with a power supply at the same time allowing for redundant power supplies.

Power Input Module:

Special half-height module located directly behind the associated power supply.

MISCELLANEOUS

Minimum Loading:

No minimum rack load is required.

