



## Power Cabling

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This chapter describes how to connect -48 VDC power feeds to the Power Filter Units (PFUs) on the ASR 5500 chassis.



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**Important**

The -48 VDC Battery Return (BR) input terminals to the PFUs are not connected to the equipment frame (chassis) are treated as Isolated DC returns (DC-I) in compliance with GR-1089-CORE (sec.9.8.3).

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This chapter includes the following sections:

- [Power Considerations, page 1](#)
- [Internal Power Planes, page 2](#)
- [Power Cable Requirements, page 5](#)
- [Connect Power Feeds to the PFUs, page 7](#)

## Power Considerations

Each chassis supports up to eight -48 VDC, 80-amp power feeds, four per PFU. Each feed consists of a supply and return cable.



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**Important**

The power source must be a UL/CSA listed device with a regulated output no greater than -60VDC.

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Typically, the DC power feeds are fed from a power distribution frame (PDF) to a power distribution panel (PDP) at the rack.



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**Important**

The DC power Battery Return (BR) or positive terminal, must be grounded at the source end (power feed or mains power end).

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**Important**

Minimum 4 AWG multiple strand, high-flex cable is recommended for final connections from the PDP to the PFUs. Although the chassis configuration may not draw maximum power, it should be sized and wired to handle 12.8 kW of power to accommodate future expansion. See [Power Cable Requirements](#), on page 5.

Each feed connects to supply and return terminals on the rear of the PFUs using two-hole lugs crimped to the end of each cable. The feed cables are routed through openings in each side of the chassis. The input terminals are wired through EMI filters to the ASR 5500 backplane.

For a non-redundant chassis power configuration, live power feeds must be connected to all four power inputs on PFU-A. For a redundant power configuration, live power feeds must be connected to all four power inputs on PFU-B. The four power feeds per PFU assure that all power planes in the backplane are energized; power is available to all card slots in the chassis. For additional information, see [Internal Power Planes](#), on page 2.

The circuit breakers at the power distribution panel must disconnect the supply line of each -48VDC feed. However, it is recommended that the circuit breakers at the power distribution panel simultaneously disconnect both poles (supply and return) for each -48 VDC feed to completely isolate the ASR 5500 from the power source.

To maintain power redundancy, separate -48 VDC supply circuits should be used to feed each DC power input on both PFUs.

**Caution**

Set the circuit breakers on the distribution panel to the OFF position before making the power connections at the PFUs.

Each power input cable must be terminated with a supplied Panduit LCD4-14AF-L 2-hole, 90-degree lug using the appropriate crimping tool and die.

The following alternate lug types (not supplied with the chassis) are also approved for use on the power feeds:

- Panduit LCC4-14AF-L, 4 AWG, 2-hole, 90-degree long barrel lug
- Burndy YAZ2C2TC1490, 2 AWG, 2-hole, 90-degree long barrel lug

If a DC power input should fail, the operating supply circuits continue to power the ASR 5500.

## Internal Power Planes

Four inputs are labeled A1 through A4 and the other inputs are labeled B1 through B4. A1 is redundant for B1 and so on. The inputs correspond to the four power planes that supply power to various chassis components as shown in the table and figure below.

The SSC monitors all eight feeds for outages.

**Important**

All four power inputs on a PFU must be connected to live power feeds to assure that all card slots in the ASR 5500 chassis are energized.

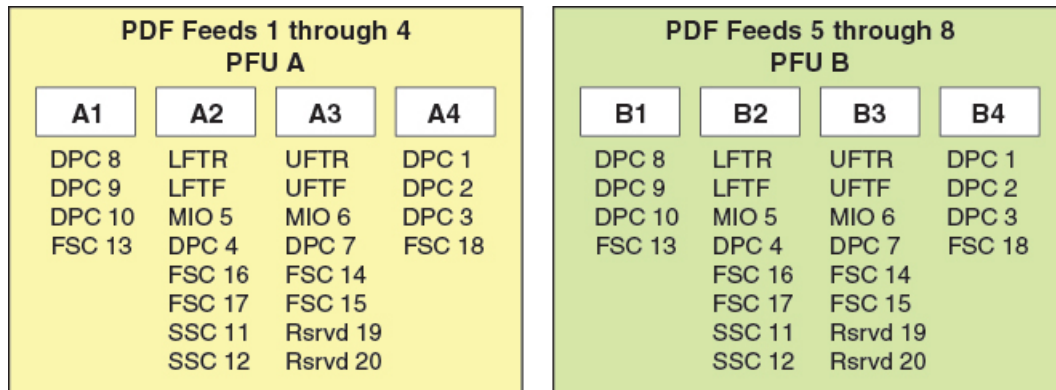
## Chassis Power Card Slot Allocations

**Table 1: Chassis Power Planes**

Card Type	Slot	Plane 1	Plane 2	Plane 3	Plane 4
<b>Rear Cards</b>					
DPC or UDPC, DPC2	1	—	—	—	Yes
DPC or UDPC, DPC2 or UDPC2	2	—	—	—	Yes
DPC or UDPC, DPC2 or UDPC2	3	—	—	—	Yes
DPC or UDPC, DPC2 or UDPC2	4	—	Yes	—	—
MIO or UMIO	5	—	Yes	—	—
MIO or UMIO	6	—	—	Yes	—
DPC or UDPC, DPC2 or UDPC2	7	—	—	Yes	—
DPC or UDPC, DPC2 or UDPC2	8	Yes	—	—	—
DPC or UDPC, DPC2 or UDPC2	9	Yes	—	—	—
DPC or UDPC, DPC2 or UDPC2	10	Yes	—	—	—
<b>Front Cards</b>					
SSC	11	—	Yes	—	—
SSC	12	—	Yes	—	—
FSC	13	Yes	—	—	—
FSC	14	—	—	Yes	—
FSC	15	—	—	Yes	—
FSC	16	—	Yes	—	—
FSC	17	—	Yes	—	—
FSC	18	—	—	—	Yes
Reserved	19	—	—	Yes	—
Reserved	20	—	—	Yes	—

Card Type	Slot	Plane 1	Plane 2	Plane 3	Plane 4
<b>Fan Trays</b>					
Upper	Top	—	—	Yes	—
Lower	Bottom	—	Yes	—	—

**Figure 1: PFU Redundant Power Planes**



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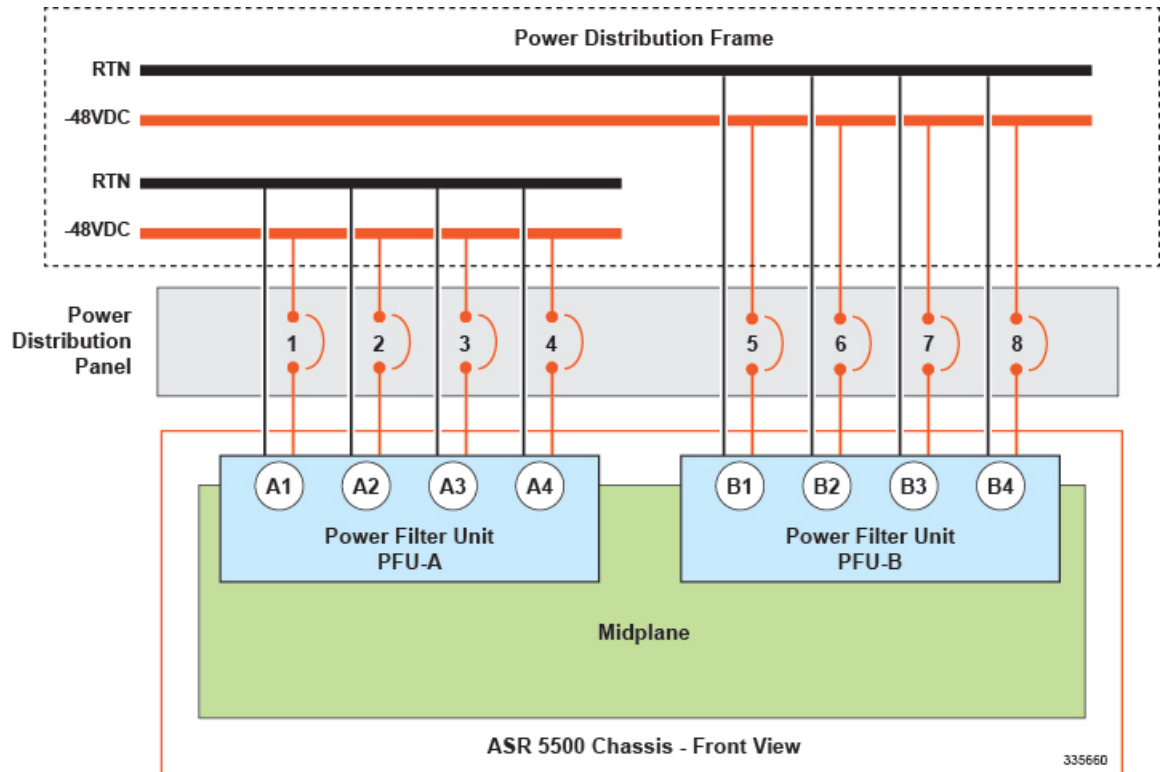
Legend	Description
DPC	DPC/UDPC or DPC2/UDPC2
LFTR	Lower Fan Tray Rear
LFTF	Lower Fan Tray Front
MIO	MIO/UMIO
UFTR	Upper Fan Tray Rear
UFTF	Upper Fan Tray Front

## Power Feed Connections

The figure below shows a recommended method for connecting -48 VDC power feeds from the power distribution frame (PDF) through a power distribution panel (PDP) to the power filter units (PFUs) on the ASR 5500 chassis.

This method preserves electrical redundancy from the PDF to the PFUs.

**Figure 2: Power Feeds to the ASR 5500 Chassis**



## Power Cable Requirements

### Sizing Power Cables

The following guidelines should be adhered to when sizing cable gauges for connecting the PFUs to a rack-mounted power distribution panel.

- Each conductor between the PDF and PDP should be calculated assuming a 0.3 volt drop from the PDF to the panel.
- Each cable between the PDP and ASR 5500 PFUs should be calculated a 0.3 volt drop from the panel to the chassis. This is a total voltage drop of 0.6 volts.
- Use high-flex, multiple-strand cable (minimum 4 AWG) between the power distribution panel and the chassis.

**Important**

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Even if the ASR 5500 chassis will not be completely filled with cards, size the cables for maximum power draw according to the above recommendations. This practice facilitates future expansion as more cards are added and the power supply is appropriately incremented.

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## Terminating Power Cables

Each cable should be terminated with a 90 degree, 2-hole lug (supplied). Each feed consists of a supply (-48VDC) and return (RTN) cable. The feed cables terminate at the rear of each PFU on 0.25-inch posts spaced 0.63-inch on center.

### Cable Routing

All feed cables must be routed through the openings at the upper rear sides of the chassis.

### Method of Connection

The method of connection at each PFU terminal is: flat washer, lug, lock washer and nut (7/16-inch). The nut(s) must be torqued to 50 in-lb. (5.65 N-m).

### Insulate Lugs

Use heat shrink tubing or non-conductive tape to insulate much of the exposed metal on the lug without interfering with the attachment point.

### Crimp Lugs on Cables


Use the Panduit® lugs supplied with the chassis (LCD4-14AF-L). The lug must be crimped to the end of a ground cable using Panduit crimp tool part number CT-720-1 (die color: gray, P29). The wire strip length is 7/8-inch (22 mm).


Follow the OEM recommendations for preparing and crimping the lugs on the ends of each feed cable.

### Label All Cables

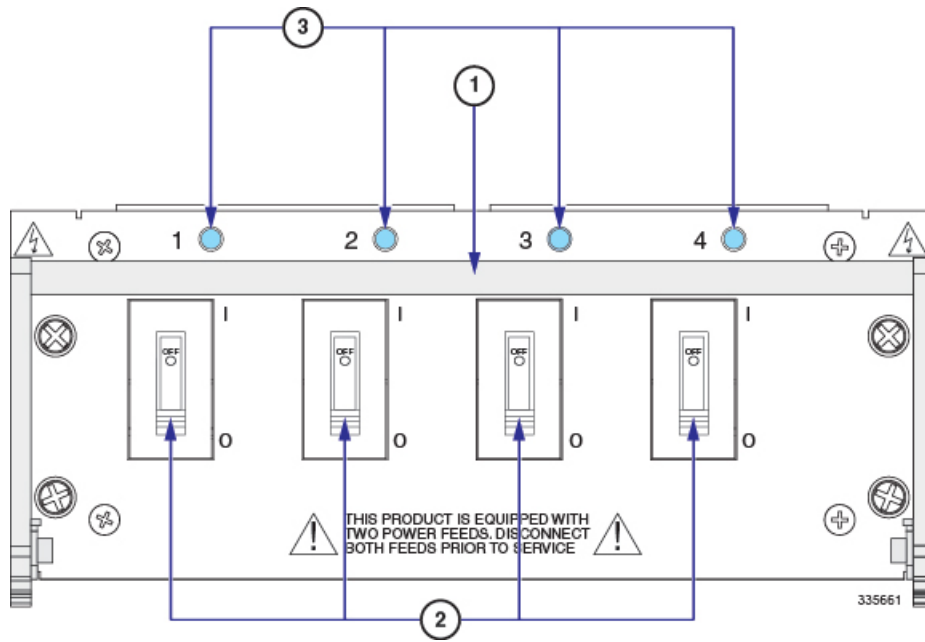
Label the supply and return cables going to each terminal on the rear of the PFUs. Include the terminal number (A-1 to A4, B1 to B4) and power distribution panel circuit number. This will facilitate troubleshooting, as well as removal and replacement of a failed PFU.

# Connect Power Feeds to the PFUs

**Caution**  To avoid personal injury or possible equipment damage, ensure that the circuit breakers for all ASR 5500 chassis feeds from the power distribution panel are all set to OFF before attempting to attach power cables to the PFU(s).

**Caution**  Verify that all circuit breakers on the front panels of both PFUs (four per PFU) are set to OFF before attaching power feed cables to the PFUs (see figure below). The breakers must remain OFF until the chassis is to be powered up.

**Figure 3: PFU Front Panel**



1	Handle	2	Circuit breaker
3	Blue LED		

**Important**

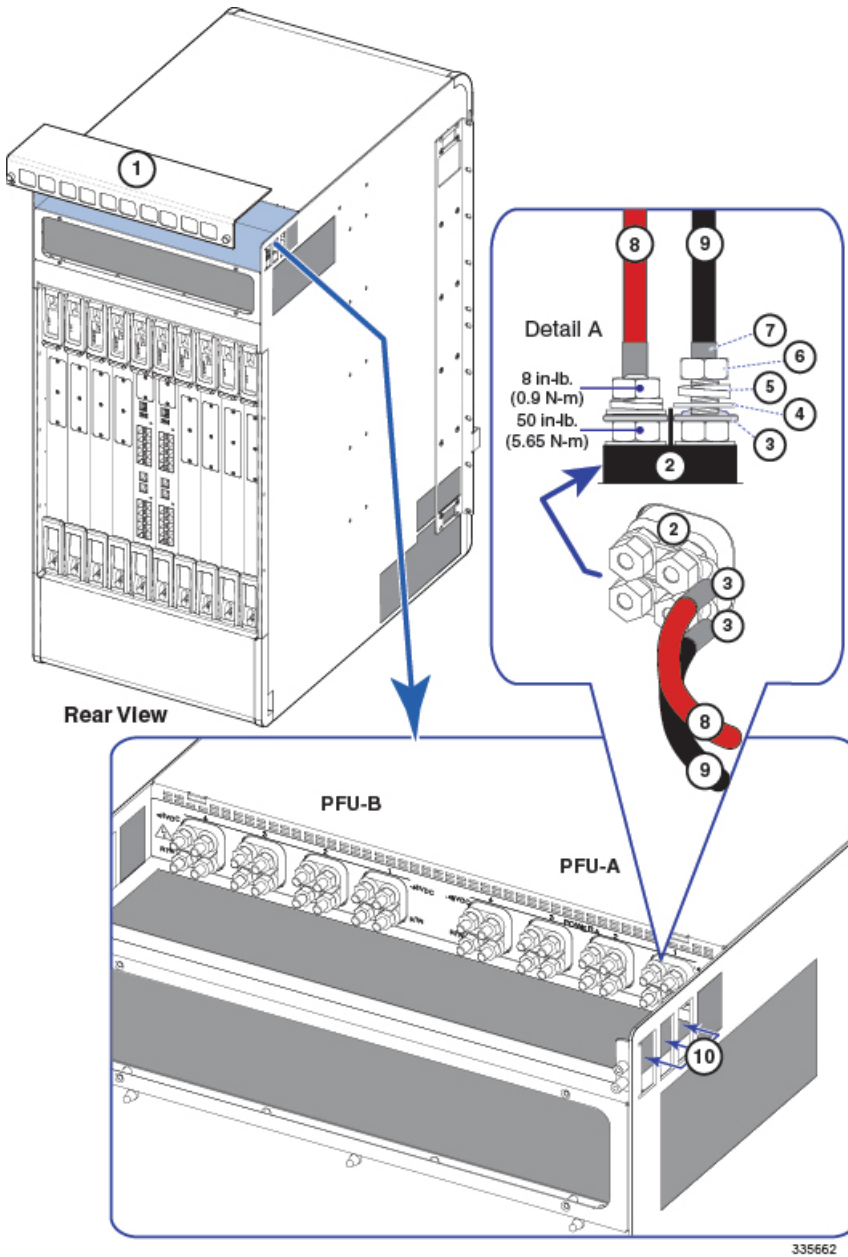
The eight power terminals on the back of each PFU are shipped with nuts and washers attached.

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- Step 1** Remove the plastic power input cover from the top-rear of the ASR 5500 chassis. Use a Phillips #2 head screw driver to loosen the two captive screws securing the cover to the chassis. Removing this cover exposes the power feed terminals at the rear of the PFUs.
- Step 2** Remove one nut, a lock washer and a flat washer from each of the eight terminals; leave the bottom nut on each terminal. The nuts on the PFU terminals require a 7/16-inch nut driver or socket wrench for removal.
- Step 3** Before proceeding, verify that the bottom nuts on all terminals are torqued to 50 in-lb. (5.65 N-m).
- Step 4** Slide a 1.25 in. (3.2 cm) length of heat shrink tubing over the end of each feed cable. You can skip this step if you choose to use non-conductive tape to insulate the crimp portion of the 2-hole lug.
- Step 5** Crimp a 2-hole 90o lug to each -48 VDC and Return cable.
- Step 6** Slide the heat shrink tubing over the crimp portion of the lug until it contacts the flat attachment point. Use a heat source to warm the tubing until it tightly wraps the metal. Alternatively, you can firmly wrap the crimp portion of the lug with a non-conductive tape.
- Step 7** Thread each cable through an opening in the side of the chassis and route it to the appropriate terminal (-48V 1, Return 1, -48V 2, Return 2, etc.). Rectangular openings are provided at the sides of the chassis for this purpose. See the figure below.
- Caution** Do not route any cables through openings in the plastic power input cover. The openings are for air flow only.
- Step 8** Install each lug over the two terminals.
- Step 9** Secure each lug to the terminals with flat washers, lock washers and nuts. Tighten the nuts while holding the lug perpendicular to the attachment studs and maintaining as much separation as possible with adjacent cables. The nuts should be torqued to 50 in-lb. (5.65 N-m).
- Important** The supply and return lugs for each power feed will be separated by the ridge in the insulating spacer shown in Detail A of the figure below.
- After all feeds are attached, move/push all cables to verify there are no potential shorts.
- Caution** To avoid the risk of fire, take proper precautions to ensure that the power supply and return lugs are not touching.
- Step 10** Continue installing the feeds on the terminals until all power feed connections have been completed to both PFUs.
- Step 11** Reinstall the plastic terminal cover on the top-rear of the chassis.
- Caution** To avoid the risk of personal injury and/or potential damage to the system, never operate the chassis without the power input cover.



**Step 12** Proceed to the *System Power-up* chapter for information and instructions on applying power to the chassis and verifying that the installation was successful.

**Figure 4: PFU Rear Power Connections**



1	Power input cover	2	Insulating spacer
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3	2-hole, 90° lug	4	Flat washer
5	Lock washer	6	7/16-inch hex nut
7	Non-conductive wrap	8	-48VDC Supply cable
9	-48VDC return cable	10	Cable access opening

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