

# M5 and M10 Routers Power Supply and Power Cord Component Replacement Instructions

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This document describes how to remove and replace the AC and DC power supplies, the AC power cords and the DC power cables in a Juniper Networks M5 or M10 Internet Backbone Router.

For additional installation and configuration information, refer to the following documentation:

- *M5 and M10 Internet Backbone Routers Hardware Installation Guide*
- *JUNOS Internet Software Command Reference*
- JUNOS Internet software configuration guides

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## Power Supply Description

The router has two power supplies, which are located at the lower rear of the chassis. The power supplies are internally connected to the midplane, which distributes the different output voltages they produce throughout the system and its components.

The power supplies are fully redundant, and load-share during normal operation. A single power supply can provide full power (up to 434 W) for as long as the router is operational. Redundancy is necessary only if one of the power supply fails.

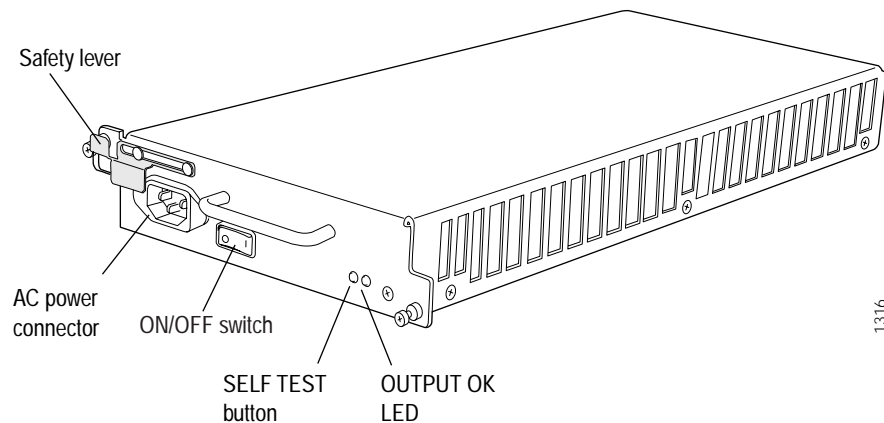
Power supplies are hot-removable and hot-insertable, but you must turn off the power to the individual power supply before removing it from the chassis. Each power supply has a handle to facilitate removal from the chassis. When one power supply fails or is switched off, the other power supply immediately and automatically assumes the entire electrical load.

The router supports AC and DC power supplies (see Figure 1 and Figure 2, respectively). An enable control signal on the output connector ensures that the power supply is fully seated into the router midplane before the power supply can be turned on. The enable pin prevents a user-accessible energy hazard, so there is no interlocking mechanism. The enable pin disables the voltage at the output connector if the power supply is not turned off before removal.

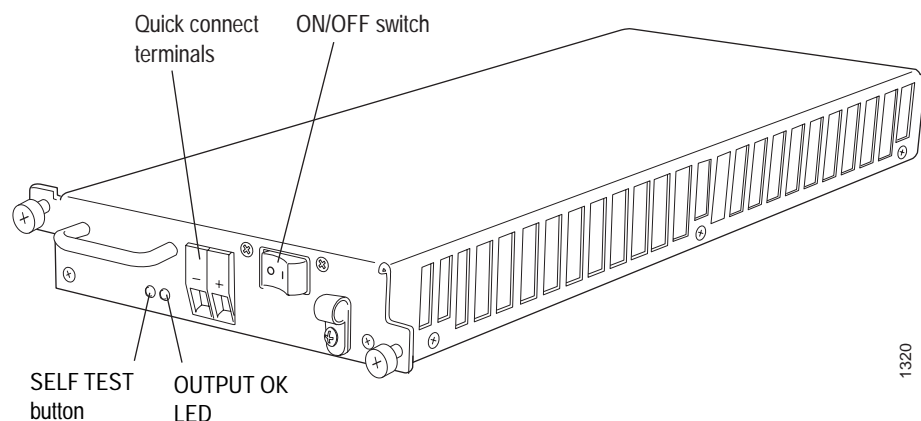


The router supports either AC or DC power supplies. It can be equipped with either two AC or two DC power supplies, but you cannot mix the two types.

**Figure 1: AC Power Supply**



**Figure 2: DC Power Supply**



## Power Supply LED and Self-Test Button

Table 1 describes the output LED and self-test button for both the AC and DC power supplies.

**Table 1: Power Supply LED and Self-Test Button**

Label	Color	State	Description
OUTPUT OK	Blue	On steadily	Power supply is functioning normally, input is occurring, outputs are within range, and the temperature is within range.
		Blinking	Indicates that the power supply has failed.
SELF-TEST	(button)	–	Initiates the power supply self-test.

## Power Supply Electrical Specifications

Table 2 lists the AC power supply electrical specifications, and Table 3 lists the DC power supply electrical specifications.

**Table 2: AC Power Supply Electrical Specifications**

Description	Specification
Power supply	434 W maximum
Input voltage	100–264 VAC operating range
Input line frequency	47–63 Hz, autoranging
Input current rating	8.0 A @ 100 VAC, 4.0 A @ 240 VAC
Output voltage	+ 1.5 V, + 2.5 V, + 3.3 V, + 5.0 V, + 12 V, + 12V

**Table 3: DC Power Supply Electrical Specifications**

Description	Specification
Power supply	434 W maximum output
DC input voltage	–42.5 through –72 VDC operating range
Input DC current rating	13.5 A @ –48 VDC
Output voltage	+ 1.5 V, + 2.5 V, + 3.3 V, + 5.0 V, + 12 V, + 12V



**Note**

The DC power supplies are marked –48 VDC, which is the nominal voltage associated with the battery circuit. You should associate any higher voltages with float voltages for the charging function.

## **Power Supply Cables**

AC power supply cords are country-specific. The AC inlet is oriented to allow a standard right-angle power cord to exit to the right of the power supply. The power supply has a latching mechanism you can use to for straight power cords.

DC power supply cables are 12 AWG, single-strand-count wire cable, with two leads. The cables connect to the input and return quick connect terminals on each DC power supply.

## **Grounding Guidelines**

To meet safety and EMI requirements and to ensure proper operation, the router must be properly grounded. AC power supplies are equipped with a grounded plug, so no additional grounding is necessary on routers that use AC power supplies.

To ground a router that uses DC power supplies, attach a grounding cable to one of the chassis grounding points using a cable lug that attaches to the end of the grounding cable. The grounding cables must be 12 AWG cable that are long enough to connect to the grounding points.

## **Tools and Parts Required**

To replace a power supply, you need the following tools and parts:

- Philips (+) screwdrivers, numbers 1 and 2
- Flat-blade (–) screwdrivers, 3/16 in. and 1/4 in.
- ESD grounding wrist strap
- Wire cutters
- Pliers

## **Replace an AC Power Supply**

To replace an AC power supply, use the following procedures:

- Remove an AC Power Supply on page 5
- Install an AC Power Supply on page 6
- Verify That an AC Power Supply Is Installed Correctly on page 7

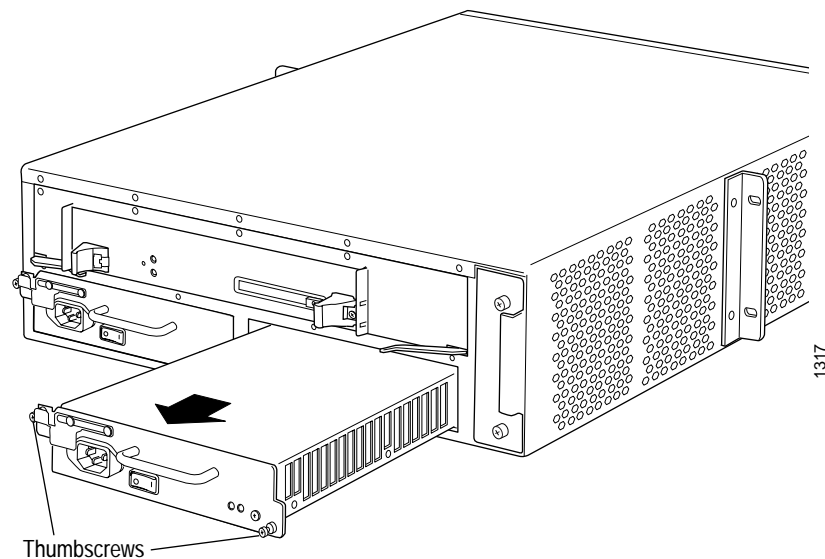
## Remove an AC Power Supply

The AC power supplies are located at the bottom rear of the chassis. Each AC power supply weighs approximately 12 lbs (5.5 kg).

To remove an AC supply, follow this procedure (see Figure 3):

1. Attach an ESD wrist strap to your bare wrist and connect the wrist strap to one of the two ESD points on the chassis.
2. Locate the power switch and flip it to the off position.
3. Unplug the power cord from the power supply, and then move the safety lever to the open and unlatched position.
4. Using a screwdriver, loosen the thumbscrews on the upper left and lower right sides of the power supply. Turn one thumbscrew a few rotations and then turn the other thumbscrew a few rotations to disengage the power supply from the midplane evenly.
5. Grasp the handle on the power supply faceplate with one hand. Slide the power supply about three quarters of the way out of the power supply bay.
6. Place your other hand underneath the power supply to support its weight and remove it from the chassis.

**Figure 3: Remove an AC Power Supply**



## Install an AC Power Supply

You install an AC power supply in the lower rear of the chassis.



**Note**

The AC power supply contains an AC plug receptacle, which accepts one end of an external 2-1/2-m AC power cord. The other end of the AC power cord has a plug that fits into the power source receptacle that is standard for your geographic location. There are five types of plugs (see Figure 21 on page 46).

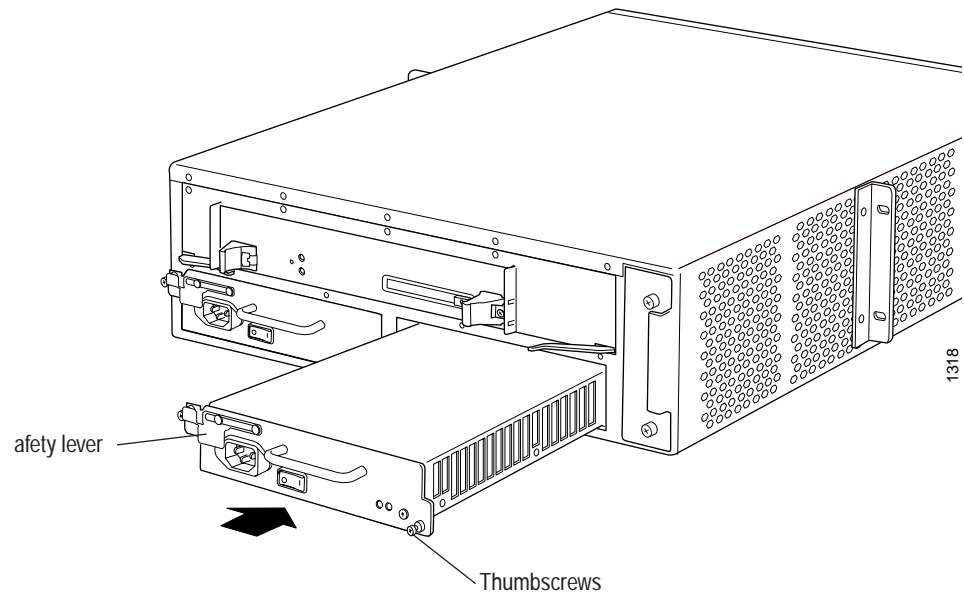


**Note**

If you have received the wrong type of power cord, contact your service representative for a replacement.

To install an AC power supply, follow this procedure (see Figure 4):

1. Attach an ESD wrist strap to your bare wrist and connect the wrist strap to one of the two ESD points on the chassis.
2. Verify that the power switch on the power supply is in the off position.
3. Grasp the power supply handle with one hand and move your other hand underneath the power supply to support it and align the rear of the unit with the slide guides inside the chassis.
4. Slide the power supply into the chassis.
5. Using a screwdriver, tighten the thumbscrews on the left and right sides of the power supply. Be careful to not overtighten them.
6. Locate the AC power cord. Verify that the AC power cord shipped with the power supply is the correct type for your site.
7. Make sure the safety lever is in the open position, and plug the AC power cord into the receptacle on the AC power supply.
8. Plug the other end of the power cord into the AC power source receptacle.

**Figure 4: Install an AC Power Supply**

### ***Verify That an AC Power Supply Is Installed Correctly***

To verify that an AC power supply is installed correctly, follow this procedure:

1. Make certain that the thumbscrews are tightened.
2. Turn the power switch on the power supply to the on position.

If the power supply is functioning normally, the blue **OUTPUT OK** LED on the power supply lights steadily.



**Note**

Turning on one of the power supplies causes the router to boot.

### **Replace a DC Power Supply**

To replace a DC power supply, use the following procedures:

- Remove a DC Power Supply on page 8
- Install and Wire a DC Power Supply on page 9
- Verify That a DC Power Supply Is Installed Correctly on page 11

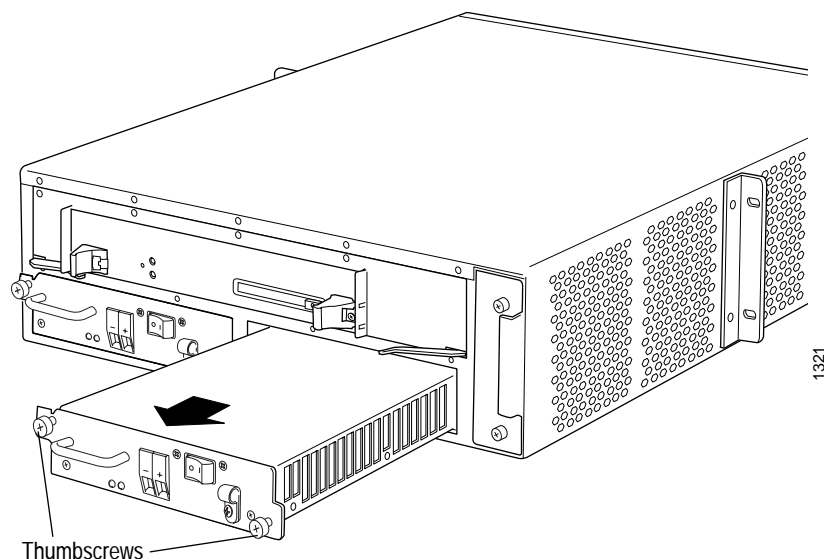
## Remove a DC Power Supply

The DC power supplies are located at the lower rear of the chassis. Each DC power supply weighs approximately 7 lbs (3.2 kg).

To remove a DC power supply, follow this procedure (see Figure 5):

1. Attach an ESD wrist strap to your bare wrist and connect the wrist strap to one of the two ESD points on the chassis.
2. Locate the power switch and flip it to the off position.
3. Using a screwdriver, loosen the screws directly above the power cables, and then pull the cables out from the terminals.
4. Unscrew the screw attaching the grounding cable to the back of the chassis and remove the grounding cable.
5. Loosen the thumbscrews at the upper left and lower right corners of the power supply. Turn one thumbscrew a few rotations and then turn the other thumbscrew a few rotations to disengage the power supply from the midplane evenly.
6. Grasp the handle on the power supply faceplate with one hand. Slide the power supply about three quarters of the way out of the chassis.
7. Place your other hand underneath the power supply to support its weight and remove it from the chassis.

**Figure 5: Remove a DC Power Supply**





## Install and Wire a DC Power Supply

You install a DC power supply into the lower rear of the chassis.

The DC power supply cables attach to the power supply with quick connect terminals. Each power supply has one input and one return terminal. Figure 4 lists the DC power and grounding cable specifications.

**Table 4: DC Power Supply Cable Specifications**

Cable Type	Cable Specification	Supplied	Maximum Length	Connector Specification
DC power cord	12 AWG wire cables	No	None	Quick connect terminals
DC grounding cable	12 AWG wire cables	Locking washers and nuts	None	Cable lug at rear of enclosure.

To install a DC power supply, follow this procedure (see Figure 6):

1. Attach an ESD wrist strap to your bare wrist and connect the wrist strap to one of the two ESD points on the chassis.
2. Verify that the power switch on the power supply is in the off position.
3. Grasp the power supply handle with one hand, placing your other hand beneath the power supply to support it, and align the rear of the unit with the guides inside the chassis.
4. Slide the power supply into the chassis. Using a screwdriver, tighten the thumbscrews on the left and right sides of the power supply. Be careful to not overtighten them.
5. Ensure that the voltage across the DC power source cable leads that you are connecting to the power supply is 0 V and that there is no chance that the cable leads might become active during the installation.



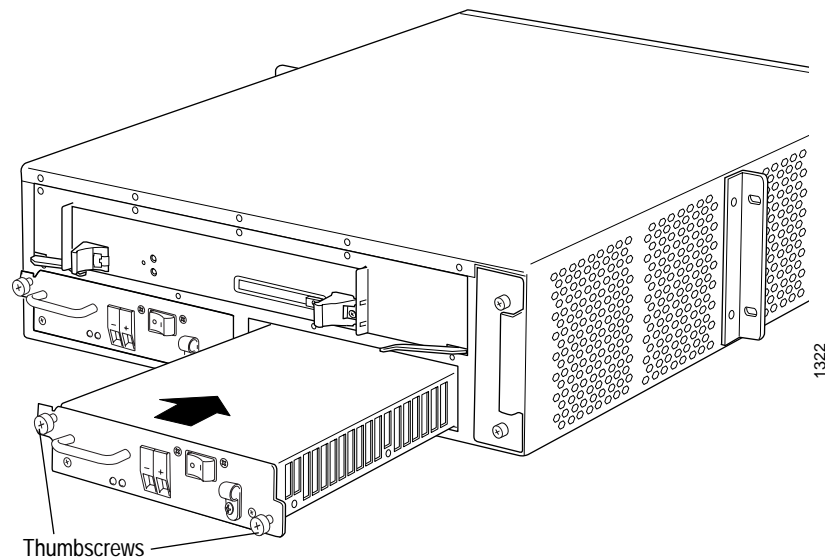
**Caution**

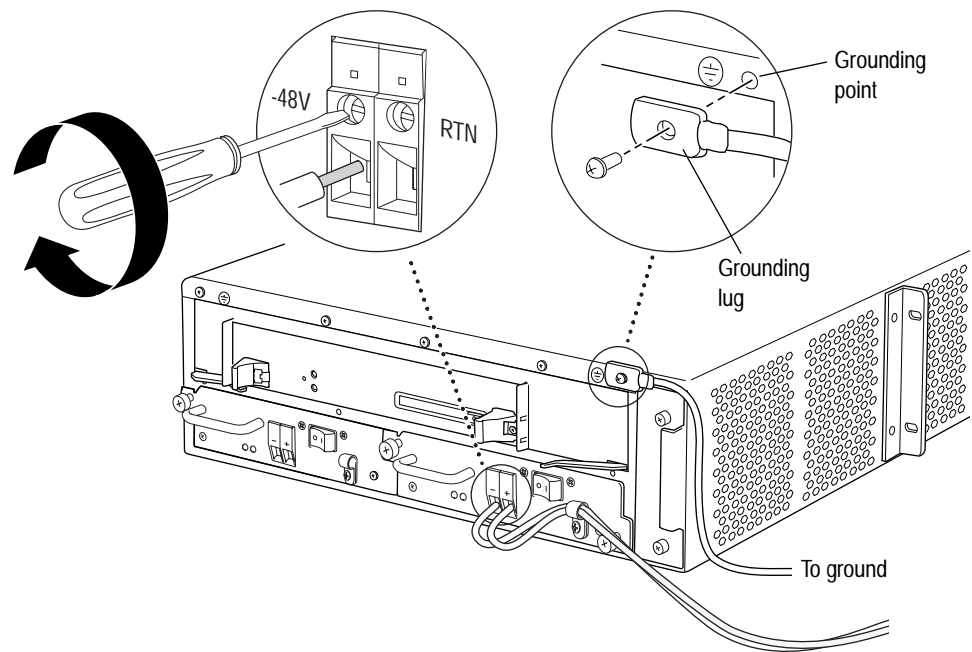
There is no color code standard for the DC wiring. The color coding used by the site DC power source determines the color coding of the DC power cable leads to the DC power supply. You must ensure that the proper polarity is connected to the DC power supply. The power source DC cables might be marked with a (+) or a (–) label, indicating the cable polarity.

6. Attach the grounding cable to the screw next to the ground symbol on the back of the chassis. Be sure to attach the grounding cable before attaching the power cables.
7. If necessary, strip the input and return ends of the power cables.
8. Thread the power cables through the cable holder on the right side of the power supply faceplate.

9. Push the exposed ends of the power cables straight into the quick connect terminals on the power supply, connecting the cables as follows (see Figure 7):
  - Connect the positive (+) source DC power cable to the **RTN** (return) terminal on the power supply.
  - Connect the negative (–) source DC power cable to the **–48 V** (input) terminal on the power supply.
10. Tighten the screws directly above the attached power cables to secure the cables in the terminals.
11. Verify that the DC power source wiring from the source DC breaker to the power supply is correct.

**Figure 6: Install a DC Power Supply**



**Figure 7: Wire the DC Power Supplies**

### ***Verify That a DC Power Supply Is Installed Correctly***

Verify that a DC power supply is installed correctly:

1. Make certain the the thumbscrews are securely tightened.
2. Turn the power switch on the power supply to the on position.

If the power supply is functioning normally, the blue **OUTPUT OK** LED on the power supply lights steadily.



**Note**

Turning on one of the power supplies causes the router to boot.

## Contact Juniper Networks

For technical support, contact Juniper Networks at [support@juniper.net](mailto:support@juniper.net). If you are reporting a software problem, please issue the following command from the CLI before contacting support:

```
user @ host> request support information | save filename
```

For documentation issues, contact Juniper Networks at [tech-doc@juniper.net](mailto:tech-doc@juniper.net).

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