Cisco Nexus 7000 Series DC Power Supply Modules

Product Overview

The Cisco Nexus® 7000 Series Switches support power supplies specifically designed for DC environments. The Cisco Nexus 7000 3.0-kW DC Power Supply Module scales from 1500W to 3000W and the Cisco Nexus 7000 6.0kW DC Power Supply scales from 1500W to 6000W. The DC power supplies deliver fault-tolerant load-sharing capability together with full support for hot-swappable DC power to the Cisco Nexus 7000 Series (Figure 1 and Figure 2).

Figure 1. Cisco Nexus 7000 3.0kW DC Power Supply Module

Figure 2. Cisco Nexus 7000 6.0-kW DC Power Supply Module

Each Cisco Nexus 7000 Series system accommodates multiple power supplies to provide both system and data center facility fault tolerance. The Cisco Nexus 7000 Series offers a variety of AC and DC power supply options to meet the diverse needs of enterprise and service provider customers.

The dual input 3.0-kW and quad input 6.0-kW DC power supplies are optimized for service provider central-office deployments. By providing support for multiple inputs, the DC power supply allows customers to customize the output power to meet their application needs.

The 6.0-kW DC power connections are made using a hot-swappable DC power cables that enables quick and easy installation of the power supplies without the need to disturb the DC terminal blocks. The DC power cable is not included with the 3.0-kW DC power supply. The DC power cable is included with the 6.0-kW power supply. In the case of the 6.0-kW power supply, the DC cable supports both direct connection to DC power sources and connection to an intermediate power interface unit in situations in which connections to the source are beyond the cable length.

The Cisco Nexus 7000 Series DC power interface unit (PIU) is an optional element that is provided for environments in which the Cisco Nexus 7000 Series DC cable needs to connect to existing DC power cabling; it provides 16 two-pole terminal connections. The PIU supports one or two Cisco Nexus 7000 6.0-kW DC power supply modules, with each power supply using two DC power cables for a total of four connections to the PIU (Figures 3 and 4). The PIU and DC power cable is not supported with the Cisco Nexus 7000 3.0-kW DC power supply modules.

Figure 3. Cisco Nexus 7000 Series 6.0kW DC Power Supply, DC Cables, and PIU

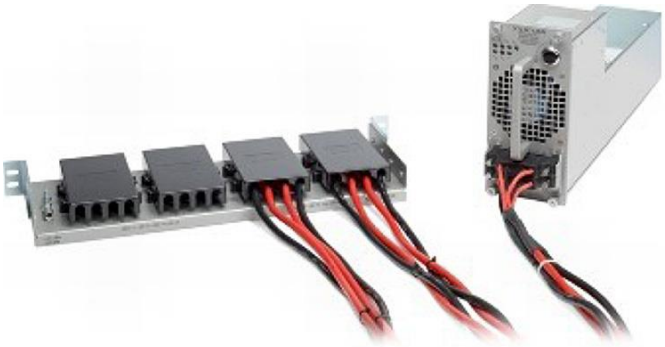


Figure 4. Cisco Nexus 7000 Series DC PIU

Features and Benefits

The Cisco Nexus 7000 3.0-kW and 6.0-kW DC Power Supply Modules offer features that are designed to make operation of a DC environment simpler and reduce operating costs through common sparing, hot-swappable features, and higher efficiency. The Cisco Nexus 7000 Series also supports multiple power redundancy schemes, mixed-mode AC and DC operations, and real-time power information. The following list presents the main features:

- Common power supply across the Cisco Nexus 7000 9-, 10-, and 18-Slot Switches and Cisco Nexus 7000 Series systems for common sparing flexibility (6.0-kW DC power supply only)
- Efficiency greater than 91 percent, reducing power losses from conversion
- Hot-swappable power supplies for upgrades or maintenance with no service disruption
- Mixed-mode AC and DC operation, enabling migration without disruption and providing support for dual environments with unreliable AC power, with battery backup capability
- Equally sized, multiple inputs, reducing fusing requirements and maintaining a consistent supply wire gauge for all output configurations, avoiding the need for costly upgrades

Table 1 summarizes the main features and benefits of the Cisco Nexus 7000 3.0-kW and 6.0-kW DC Power Supply Module.

Table 1. Features and Benefits

Feature	Benefit
DC Power Supply	
Variable-output design configurable	Output capacity based on input configuration allows various operational modes for right sizing of power supplies and increases deployment flexibility with a common DC supply unit.
Equally sized multiple inputs	Multiple inputs allow lower fusing requirements and maintain a consistent wire gauge among different output configurations.
Peak efficiency of more than 91% (with loads greater than 25%, efficiency is more than 86%)	Higher efficiency reduces power losses and so reduces both heat and the cost of cooling the equipment.
Real-time power information	Each power supply provides actual power delivery information, allowing dynamic monitoring of system power consumption.
Compatible with current Cisco Nexus 7000 Series Switches	Compatibility provides investment protection and enables ease of sparing across members of the product family.
Hot swappable	Hot-swap capability helps ensure consistent system operation with no service interruptions for upgrades and maintenance periods (assuming that the remaining power supplies can provide enough power to support the system).
Mixed DC and AC operation	Mixed operation enables support for dual-power environments and conversion between AC and DC power.
Integrated locking latch (6kW model only) and on/off switch	Locking prevents accidental removal of the power supply when it is energized, and the on/off feature supports hot-swap capability.
Temperature sensors and instrumentation	The sensor measures the internal temperature and shuts down the power supply if the temperature exceeds thresholds, preventing damage due to overheating of the power supply.
Internal fault monitoring	Monitoring detects short circuits and component failures in the power supply unit; if a failure is found, the unit is shut down.
Variable-speed power supply fans	Variability enables the use of reduced fan speed for lower power use in controlled environments while helping ensure sufficient system cooling capacity for power supplies.
Integrated two-pole grounding terminal (6kW model only)	Industry-standard two-pole grounding terminal allows connections from left or right for ease of grounding cable routing.

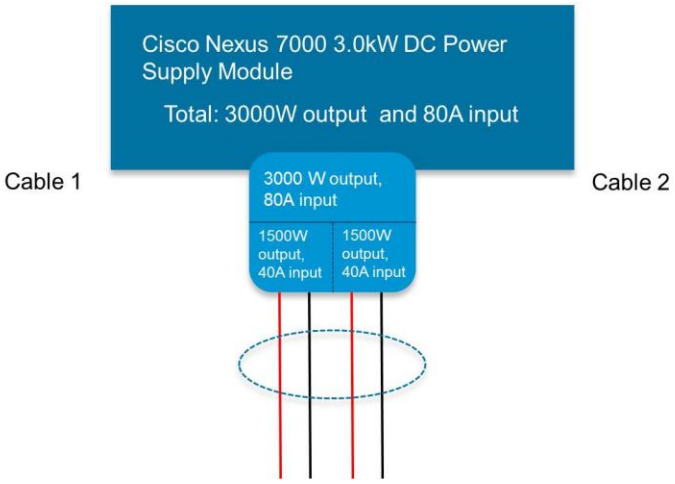
Feature	Benefit
DC Power Cable (for 6.0-kW DC Power Supply)	
Power cable with plug connector end	Connector design enables easy hot swap of power supply units.
One open end and 15-foot length	Cable design allows termination of cables to installation- and site-specific lengths, reducing unnecessary power cable slack. The cable open end is connected to the customer's DC power or to the DC PIU.
GR-347 rated	Cable is designed for telecommunication environments.
DC Power Interface Unit (for 6.0-kW DC Power Supply)	
Industry-standard dual-post terminals	Terminals support industry-standard terminal lug nuts for AWG 4 cables (local electrical codes determine cable gauges).
Easy connections between customer wiring and Cisco Nexus 7000 Series DC power cable	Design avoids the challenges of supporting many connection pairs in confined areas and provides easy access and a simple dual-terminal lug interface between customer -48V cabling and the Cisco Nexus 7000 Series DC power cable for distances up to 15 feet.
High density	Design supports up to four cables and two power supplies in a one-rack-unit (1RU) panel.
Passive design	No electronic or electrical elements are used, eliminating common causes of failure and helping ensure extremely high reliability.
Removable terminal covers	Design includes separate removable terminal covers for making additional connections without the need to disconnect all the terminal lugs.
Front, middle, and rear rack-mount options	Multiple rack-mount options allow flexible positioning of the PIU for ease of installation and simpler management of DC power connections.

Product Architecture

The 3.0-kW DC power supply has two isolated input stages, each delivering up to 1500W of output power. Each stage uses a -48V DC connection. The unit will deliver 1551W when only 1 input is active and 3051W when 2 inputs are active.

Figure 5 shows the connections to the power supply inputs.

Figure 5. Cisco Nexus 7000 3.0-kW DC Power Supply Module Connections and Power Ratings

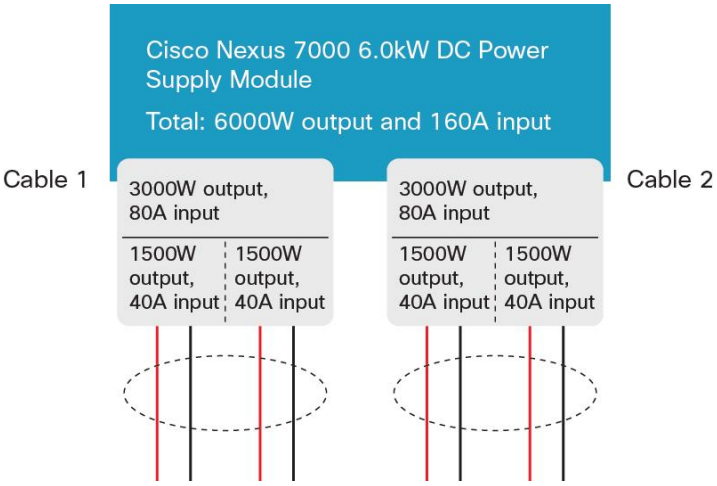


The 6.0-kW DC power supply has four isolated input stages, each delivering up to 1500W of output power. Each stage uses a pair of -48V DC connections. The Cisco Nexus 7000 Series DC power cable supports two pairs of input connectors to a single power supply input connection, which enables up to 3000W of output by providing single or dual input mode operation. A second DC power cable supports two additional pairs of input connectors to

the second power supply input, which extends the power range by allowing triple or quad input mode operation for up to of 6000W of output power.

Figure 6 shows the connections to the power supply inputs.

Figure 6. Cisco Nexus 7000 6.0-kW DC Power Supply Module Connections and Power Ratings



When required, the DC PIU is used to connect between the Cisco Nexus 7000 Series DC power cable and customer DC cabling using two-pole terminations to make the connections. Each Cisco Nexus 7000 Series DC power cable connects to the output side, and existing customer cabling connects to the input side, using industry-standard two-pole lugs and lug nuts. The PIU design simplifies the DC-to-DC connections and can be mounted in a 19-inch rack.

Cisco Nexus 7000 Series Power Redundancy

Cisco Nexus 7000 Series Switches support multiple load-sharing, fault-tolerant, and hot-swappable power supplies. As few as just one power supply can be used to operate a chassis. Using multiple power supplies provides additional power capacity and resilience after failure of the power supply, the generating supply itself, or a facility component such as an uninterruptible power supply (UPS) or a circuit breaker.

Cisco Nexus 7000 Series systems can operate in four user-configurable power-redundancy modes, summarized in Table 2, to meet the redundancy needs of the environment.

Table 2. Cisco Nexus 7000 Series Power Redundancy Modes

Redundancy Mode	Description
Combined	No redundancy; power available to the system is the sum of power outputs of all power supplies in the chassis.
Power supply redundancy (N+1)	System default redundancy mode; guards against failure of one of the power supplies; power available to the system is the sum of the two least-rated power supplies.
Input source redundancy (grid redundancy)	Guards against failure of one input circuit (grid); for grid redundancy, each input on the power supply is connected to an independent power feed (AC or DC), and power available to the system is the minimum power from either of the input sources or grids.
Power supply and input source redundancy (full redundancy)	Guards against failure of either one power supply or one power source, and power available is always the minimum of input source and power supply redundancy.

The power budget available to the Cisco Nexus 7000 Series system depends on the types of power supplies installed, the number of connected inputs, and the configured power supply redundancy mode. Tables 3, 4 and 5 show the available power for two to four 3.0-kW DC power supplies in the various redundancy modes. Tables 6, 7 and 8 show the available power for two to four 6. 0-kW DC power supplies in the various redundancy modes.

Table 3. Available Output Power for Two 3.0-kW DC Power Supply Units

Power Supply Input	Redundancy Mode			
	Combined	Power Supply	Input Source	Full
Single-input mode	3000W	1500W	1500W	1500W
Dual-input mode	6000W	3000W	3000W	3000W

Table 4. Available Output Power for Three 3.0-kW DC Power Supply Units

Power Supply Input	Redundancy Mode			
	Combined	Power Supply	Input Source	Full
Single-input mode	4500W	3000W	4500W	3000W
Dual-input mode	9000W	6000W	NA*	4500W

* Not applicable since only an odd number of inputs are available for this case.

Table 5. Available Output Power for Four 3.0-kW DC Power Supply Units

Power Supply Input	Redundancy Mode			
	Combined	Power Supply	Input Source	Full
Single-input mode	6000W	4500W	6000W	4500W
Dual-input mode	12000W	9000W	NA*	6000W

* Not applicable since only an odd number of inputs are available for this case.

Table 6. Available Output Power for Two 6.0-kW DC Power Supply Units

Power Supply Input	Redundancy Mode			
	Combined	Power Supply	Input Source	Full
Single-input connector mode	6000W	3000W	3000W	3000W
Dual-input connector mode	12,000W	6000W	6000W	6000W

Table 7. Available Output Power for Three 6.0-kW DC Power Supply Units

Power Supply Input	Redundancy Mode			
	Combined	Power Supply	Input Source	Full
Single-input connector mode	9000W	6000W	9000W	6000W
Dual-input connector mode	18,000W	12,000W	9000W	9000W

Table 8. Available Output Power for Four 6.0-kW DC Power Supply Units

Power Supply Input	Redundancy Mode			
	Combined	Power Supply	Input Source	Full
Single-input connector mode	12,000W	9000W	12,000W	9000W
Dual-input connector mode	24,000W	18,000W	12,000W	12,000W

Product Specifications

Table 9 lists product specifications for the Cisco Nexus 7000 3.0-kW DC and 6.0-kW DC Power Supply Module. Table 10 provides regulatory compliance information.

Table 9. Product Specifications

Item	Specification	
	3.0kW DC power supply	6.0kW DC Power Supply
Chassis compatibility	Cisco Nexus 7000 4-slot Switch (up to 4)	Cisco Nexus 7000 9-Slot Switch (up to 2) Cisco Nexus 7000 10-Slot Switch (up to 3) Cisco Nexus 7000 18-Slot Switch (up to 4)
Software compatibility	Cisco® NX-OS Software Release 6.1.2 or later	Cisco® NX-OS Software Release 5.0 or later
Output holdup time	8 milliseconds (ms) for ½ load, 4 milliseconds (ms) for full load	
Physical dimensions (H x W x D)	DC power supply: • 1.75* x 3.95 x 22in. (4.45* x 10.1 x 55.9 cm) • Weight: 11 lb (5 kg)	DC power supply: • 8.51* x 4 x 21.25 in. (21.6* x 10.1 x 53.9 cm) • Weight: 21 lb (9.5 kg) PIU: • 1.75 x 17.3 x 6.0 in. (4.44 x 43.95 x 15.24 cm) • Weight: 5 lb (2.27 kg) * The height of the power supply unit is not uniform along the entire depth. The height at the front and rear are 8.51 and 4.2 in. (21.6 and 10.7 cm), respectively.
LED indicators	• Green Input LED (1 to 2): On when DC voltage in inputs 1 to 4 is within the valid range • Green Output LED: On when the DC voltage for the associated input is within the valid range • Red Fault LED: On and blinking when the power supply's internal self-diagnostics have failed or any other power supply failure has occurred • Blue ID LED: On and blinking when the operator has flagged this module for identification	• Green Input LED (1 to 4): On when DC voltage in inputs 1 to 4 is within the valid range • Green Output LED: On when the DC voltage for the associated input is within the valid range • Red Fault LED: On and blinking when the power supply's internal self-diagnostics have failed or any other power supply failure has occurred • Blue ID LED: On and blinking when the operator has flagged this module for identification
Ground	• Grounding via system chassis	• Dual stud ground connection at the front of the power supply • 1/4 in. x 20 studs
PIU terminal lugs	Industry-standard two-hole compression lugs on 5/8-in. centers	
Minimum and maximum torque	• Minimum 15 in. per lb • Maximum 40 in. per lb	
DC input voltage range	• -48 VDC nominal at 37A in North America (operating range: -40.5 to -56 VDC) • -60 VDC nominal at 30A for international (operating range: -55 to -72 VDC)	
DC input current	40A for each DC input at -48 VDC input voltage (total of four inputs)	
Power supply output	• 1500W operation (one DC input active) • 30A at 3.4 VDC • 30A at 50 VDC • 3000W operation (two DC inputs active) • 30A at 3.4 VDC	• 1500W operation (one DC input active) • 30A at 3.4 VDC • 30A at 50 VDC • 3000W operation (two DC inputs active) • 30A at 3.4 VDC

Item	Specification	
	3.0kW DC power supply	6.0kW DC Power Supply
	• 60A at 50 VDC	• 60A at 50 VDC • 4500W operation (three DC inputs active) • 30A at 3.4 VDC • 90A at 50 VDC • 6000W operation (four DC inputs active) • 30A at 3.4 VDC • 120A at 50 VDC
Reliability and availability	Capable of online insertion and removal (OIR)	
MIBs	Supports Simple Network Management Protocol (SNMP) Versions 3, 2, and 1 (see Cisco NX-OS Software release notes for details about specific MIB support)	
Cooling fan	Integrated variable speed	
Environmental conditions	• Operating temperature: 32 to 104°F (0 to 40°C) • Storage temperature: -40 to 185°F (-40 to 85°C) • Relative humidity operating, noncondensing: 10 to 90% • Relative humidity nonoperating, noncondensing: 10 to 95%	
Safety compliance	UL 60950-1 CAN/CSA-C22.2 No. 60950-1 EN 60950-1 IEC 60950-1 AS/NZS 60950-1	
EMC: Emissions	47CFR Part 15 (CFR 47) Class A AS/NZS CISPR22 Class A CISPR22 Class A EN55022 Class A ICES003 Class A VCCI Class A EN61000-3-2 EN61000-3-3 KN22 Class A CNS13438 Class A	
EMC: Immunity	EN55024 CISPR24 EN300386 KN24	
Warranty	Cisco Nexus 7000 Series Switches come with the standard Cisco 1-year limited hardware warranty	

Table 10. NEBS Compliance and ETSI 300-019 Environmental Requirements*

Specifications	Description
NEBS criteria levels	SR-3580 NEBS level 3 GR-63-CORE, issue 3; GR-1089 CORE, issue 4
Verizon NEBS compliance	Telecommunications Carrier Group (TCG) Checklist
Qwest NEBS requirements	Telecommunications Carrier Group (TCG) Checklist
ATT NEBS requirements	ATT TP76200 level 3 and TCG Checklist
ETSI	ETS 300 019-2-1, Class 1.2 Storage ETS 300 019-2-2, Class 2.3 Transportation ETS 300 019-2-3, Class 3.2 Stationary Use

* Pending approvals.

Ordering Information

To place an order, visit the Cisco Ordering homepage. To download software, visit the Cisco Software Center. Table 8 provides ordering information.

Table 11. Ordering Information

Description	Part Number
Nexus 7000 3.0KW DC Power Supply Module (cable not included) (and spare)	N7K-DC-3.0KW N7K-DC-3.0KW=
Nexus 7000 6.0KW DC Power Supply Module (cable included) (and spare)	N7K-DC-6.0KW N7K-DC-6.0KW=
Nexus 7000 DC Power Interface Unit (and spare)*	N7K-DC-PIU N7K-DC-PIU=
Nexus 7000 DC 48V-48V Cable (and spare)*	N7K-DC-CAB N7K-DC-CAB=
Nexus 7000 DC 48V-48V Canada Cable (and spare)*	N7K-DC-CAB-CAN N7K-DC-CAB-CAN=

* For 6.0kW DC Power Supply only

Service and Support

Cisco offers a wide range of services to help accelerate your success in deploying and optimizing Cisco Nexus 7000 Series Switches in your data center. Cisco's innovative services are delivered through a unique combination of people, processes, tools, and partners and are focused on helping you increase operating efficiency and improve your data center network. Cisco Advanced Services uses an architecture-led approach to help you align your data center infrastructure with your business goals and achieve long-term value. Cisco SMARTnet® Service helps you resolve mission-critical problems with direct access at any time to Cisco network experts and award-winning resources. With this service, you can take advantage of the Smart Call Home service capability, which offers proactive diagnostics and real-time alerts on your Cisco Nexus 7000 Series Switches. Spanning the entire network lifecycle, Cisco Services offerings help increase investment protection, optimize network operations, provide migration support, and strengthen your IT expertise. For more information about Cisco Data Center Services, visit http://www.cisco.com/go/dcservices.

For More Information

For more information about the Cisco Nexus 7000 Series, visit the product homepage at http://www.cisco.com/go/nexus7000 or contact your local account representative.

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