NetShelter™ Power Supply Unit

User Guide

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SENVPS33KB3

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www.se.com

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General Information

Important Safety Instructions

SAVE THESE INSTRUCTIONS - This manual contains important instructions that should be followed during installation and maintenance of the Power Supply Unit (PSU).



This is the “Read user manual” symbol. Read the user documentation to become familiar with the equipment.

Read the instructions carefully and look at the equipment to become familiar with the device before trying to install and operate it.

The following special messages may appear throughout this document or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol either to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

Failure to follow these instructions can result in injury or equipment damage.

NOTICE

NOTICE is used to address practices not related to physical injury.

Failure to follow these instructions can result in equipment damage.

Please Note

Electrical equipment should only be installed, operated, serviced, and maintained by qualified personnel. No responsibility is assumed by APC Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Always abide strictly by local laws and regulations in force in the place of installation.

EMC Note

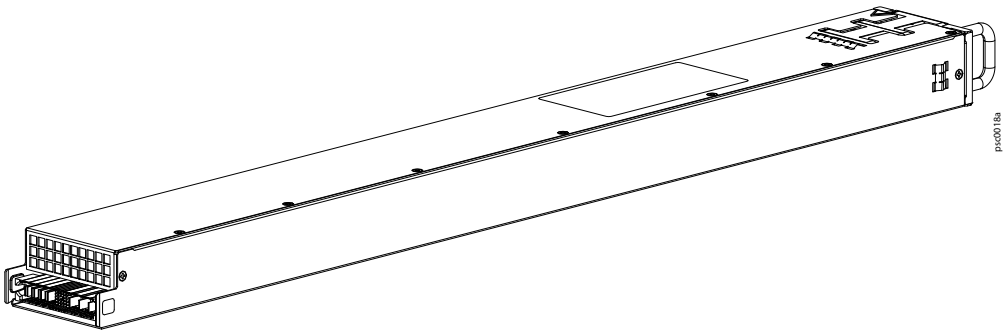
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Introduction



A powershelf Power Supply Unit (PSU) is a rack-mountable chassis that aggregates multiple hot-swappable power supply modules (often “rectifiers” for AC-to-48VDC converters) to feed a centralized DC busbar–typically 50V–serving servers, routers, storage, and AI accelerators.

For higher load capacity, multiple rectifier modules or PSUs can be connected in parallel. The system also supports the addition of an independent monitoring module to enable intelligent control and enhanced system management.

The PSU is a power-on swappable component designed for seamless integration with standard racks and cabinets.

Product Features

Environmental Characteristics

Parameter	Configuration specification
Working Temperature	–10 °C to +45 °C
Storage Temperature	–40 °C to +85 °C
Relative Humidity	5% to 95% (No condensation)
Altitude	≤ 3080 m

Electrical Characteristics

Input Characteristic Indicators

Parameter	Specification
Working Voltage	180 Vac to 305 Vac
Frequency Range	47 Hz to 63 Hz Rated at 50 Hz/60 Hz
Input Current	≤ 30 A @ 200 Vac
Power Factor (PF)	≥ 0.98 (at 100% load)
Total Harmonic Distortion (THD)	≤ 5% (at 30% to 100% load)

Output Characteristic Indicators

Parameter	Specification
Output Voltage	50 V DC / 112A, 12 Vsb / 1.0A
Rated output power	5500 W
Voltage stabilization accuracy	The PSU set point output voltage accuracy at 100% load shall be ± 0.25% or ± 0.125V.
Ripple	≤ 500 mVp-p (Bandwidth ≤ 20 MHz)
Startup time	6 seconds
Output hold-up time	> 20 ms

Mechanical characteristics

Parameter	Specification
External Dimensions	40 mm (H) × 68 mm (W) × 640 mm (D)
Weight (excluding packaging)	< 3.3 kg
Cooling Method	Forced air cooling with built-in fan (with linear speed control)

Note: For detailed slot design, contact www.se.com to obtain the 3D model of the module.

Equipment characteristics

Protective Characteristics

Input Overvoltage and Undervoltage Protection/Recovery Indicators

Input Parameters	Note	Minimum Value	Nominal Value	Maximum Vaule	Unit
UVLO Brown In		173	176	179	Vac
UVLO Brown Out	10 s delay	164	167	170	Vac
UVLO Brown Out	1.6 s delay	147	150	153	Vac
OVLO Brown In		306	309	312	Vac

Input Parameters	Note	Minimum Value	Nominal Value	Maximum Vaule	Unit
OVLO Brown Out	50 ms	310	313	316	Vac
OVLO Brown Out		173	176	179	Vac

Output Overvoltage Protection Indicators

Parameters	Minimum Value	Nominal Value	Maximum Vaule	Unit
Output overvoltage (50V)		52.5	55 V	Shut down the machine immediately and lock it
Output overvoltage (12V)			14.5	Belch restart

Output current-limiting protection Indicators

Parameters	Minimum Value	Nominal Value	Maximum Vaule	Unit	Annotation
Output overcurrent alarm and current limiting	102	107	112	% full load	
Output current limiting (50V)	115	120	125	% full load	Delay > 10 seconds Hiccup 5 time and Latch off
Output current limiting (50V)	125	130	135	% full load	Delay > 100 ms Hiccup 5 time and Latch off
Output current limiting (50V)	150	155	160	% full load	Delay > 50 ms Hiccup 5 time and Latch off
Output current limiting (50V)	160	165	170	% full load	Delay > 6.0 ms Hiccup 5 time and Latch off
Output current limiting (12V)			220	% full load	Hiccups restart
*** The maximum and minimum values represents the tolerance of the protection point, not the judgment range.**					

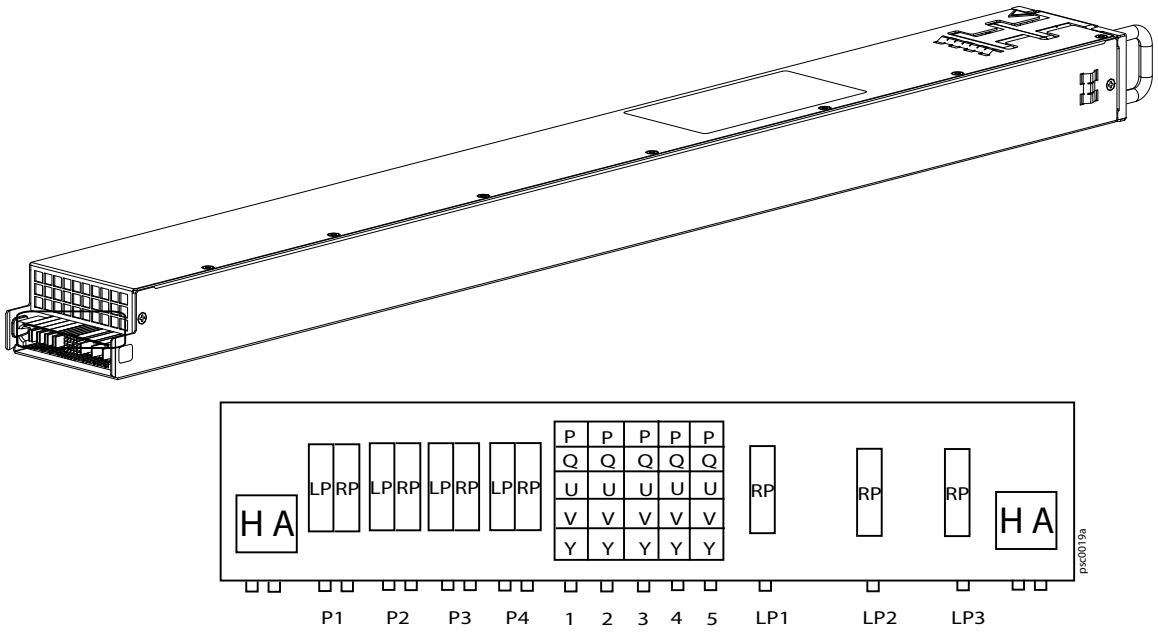
Other Protective Characteristics

Protection Type	Description
Output Short-Circuit Protection	Shuts down the unit immediately and locks the system.
Over-Temperature Protection	Includes automatic over-temperature protection.

Reliability

C-MTBF[1]	> 400K hours @45 °C 240 Vac 100% load condition (without fan)
D-MTBF[2]	> 300K hours @25 °C 240 Vac 100% load condition (without fan)
*1 - Calculated Mean Time Between Failures - Calculated per Telcordia SR-332 Issue 2, Method I, Case I (Part Count). *2 - Demonstrated Mean Time Between Failures - Verified through empirical testing.	

PSU Interface



PSU Output Terminal Pin Configuration

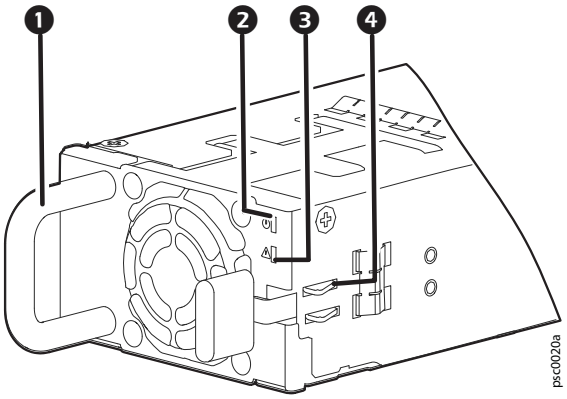
Pin Number	Signal	Comment
P1	VOUT_POS	Mate Last
P2	VOUT_POS	Mate Last
P3	VOUT_RTN	Mate First
P4	VOUT_RTN	Mate First
LP1	PE	Mate First
LP2	AC Phase_1	Mate Last
LP3	AC Phase_2	Mate Last

Signal Pin Definition

PSU Pinout	Signal Name	Type	Function
P1	PSU_A0	Input	Address 0 – PSU ID A0
P2	PSU_A1	Input	Address 1 – PSU ID A1
P3	PSU_A2	Input	Address 2 – PSU ID A2
P4	BUSBAR_CLIP_TEMP_P	Input	Busbar clip + contact temperature sensor
P5	BUSBAR_CLIP_TEMP_N	Input	Busbar clip – contact temperature sensor
Q1	Ground		
Q2	PMBALERT_N	Ground	Low: Fault Event Detected High: OK
Q3	RESET_LATCH_FAULT	Input / Active high	Low: Default, No reset High for 1-2s: Clear detected faults and start PSU if not operating due to a detected fault.
Q4	12V_STANDBY	Power	Always-on auxiliary power supply used to power the PSC. Includes protection against detected faults and backfeeding.
Q5	ISENSE_P	Output	Fast ORed current monitoring signal Diode contained within each module to OR onto a common bus.
U1	OVERCURRENT_N		Reserved for future feature When PSU current passes programmed threshold acts as fast path to trigger PSC for power regulation.

PSU Pinout	Signal Name	Type	Function
U2	AC_LOSS_N	Output	Detect loss of AC Low: AC ok High: AC loss
U3	PSKILL (Short Pin)	Input / Active High	Quick shut down Output to mitigate hot unplug arcing. Low: Output turn on High: Output turn off
U4	CANH		CANH
U5	CANL		CANL
V1	PRESENT_N		
V2	PMBUS_I2C_SDA		PMBus I2C Data
V3	PMBUS_I2C_SCL		PMBus I2C Clock
V4	Ground	Ground	PMBus I2C ground
V5	ISHARE_N	Analog	Reserved for possibility of differential current sharing bus.
Y1	ISHARE_P	Analog	Main Output current share bus.
Y2	POWER_SELECT	Input	Reserved for future use.
Y3	SYNC_START_N	BI	Synchronizing turn-on main output
Y4	ISENSE_N	Output	Fast ORed current monitoring signal Diode contained within each module to OR onto a common bus.
Y5	Ground	Ground	
Note:_N indicates that the low level is valid.			

Front Panel



Item no.	Description
❶	Handle
❷	Power indicator light
❸	Alarm indicator light
❹	Latch

LED Status

Two indicator lights are provided on the module panel to indicate the module's operating status. The detailed LED status descriptions are listed below.

Type/condition	Green LED	Amber LED
4Hz Blinking	Sync Start State, PSU is ready to turn on and awaiting the sync Start signal	Firmware loading
Solid State	50 V ON and available	50 V Fault detected
OFF State	50 V OFF	50 V Normal

Installation of the PSU

⚠ DANGER

HAZARD OF ELECTRIC SHOCK

- Do not place your hands inside the module slots.
- Only qualified personnel are allowed to plug, unplug, or replace the rectifier module when the system is powered on.

Failure to follow these instructions will result in death or serious injury.

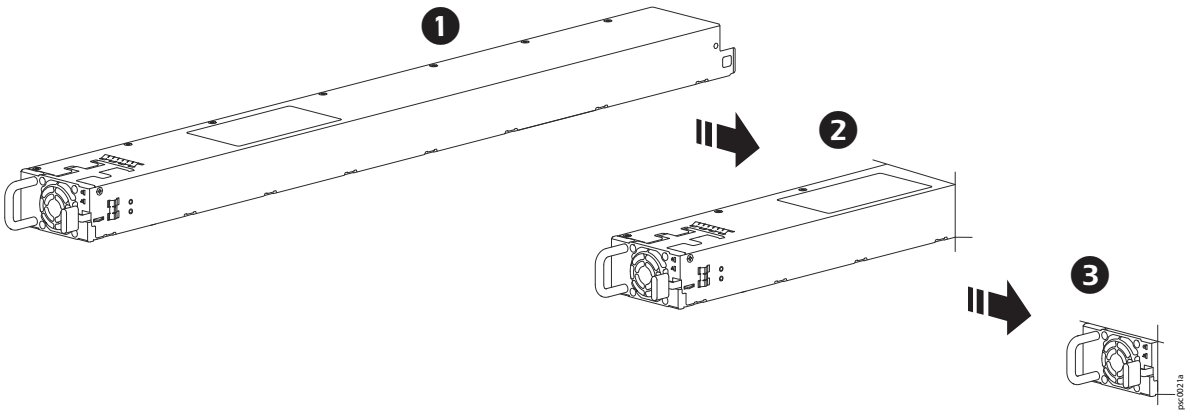
NOTICE

HAZARD OF EQUIPMENT DAMAGE

- Power on the rectifier module within seven days after unpacking. If not possible, store it indoors in a dry, non-corrosive environment.
- Do not operate the power shelf without a UPS in unstable power environment
- Secure the module to the slot with panel fixing screws immediately after installation.

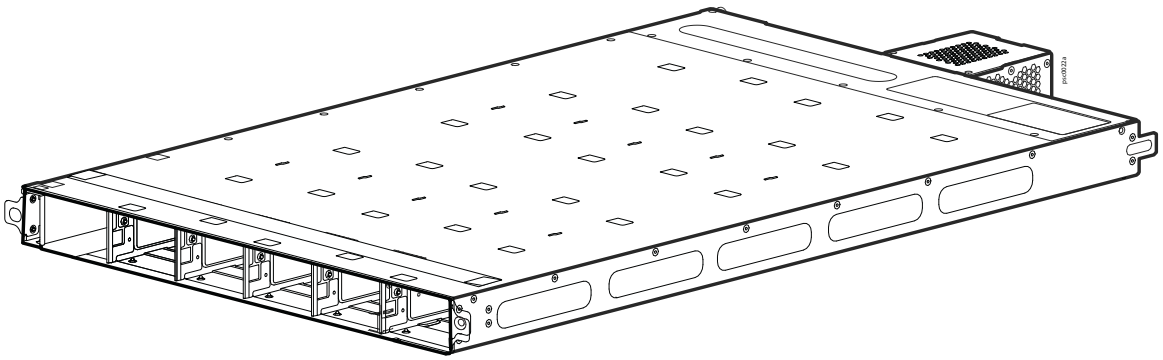
Failure to follow these instructions can result in equipment damage.

Installation



1. Remove the PSU module from the packaging box.
2. Hold the handle on the front panel and support the module with your other hand. Securely slide the module into the slot.
3. Continue to push the module forward until the front panel is flush with the distribution frame panel. You should hear a click indicating that the latch is locked.

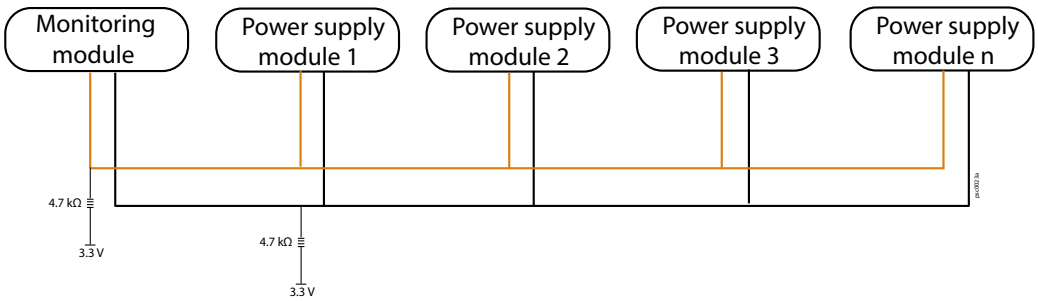
PSU Module Mounting and Slot Requirements



If the design or processing tolerances of the module slots are not properly controlled, the module may not be able to to operate correctly or may become damaged.

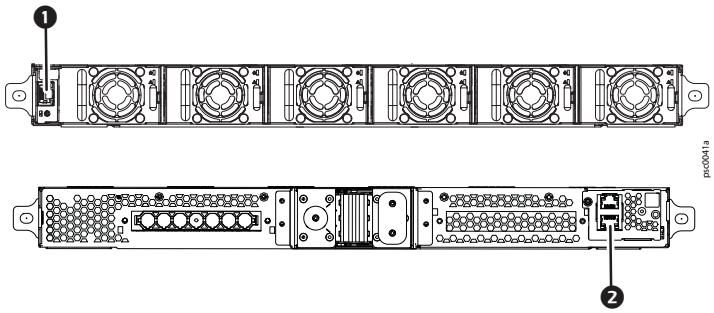
Operation

PMBUS bus communication



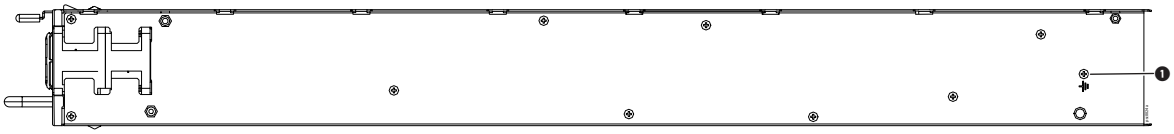
- For reliable power communication, the PMBus should use T-type wiring. Star wiring is not recommended.
- Install a 4.7 kΩ pull-up resistor to 3.3 V on both the SDA and SCL lines.

Shelf Communication Setup



- Front side: one RJ45 Ethernet Port ❶.
- Rear side: two RJ45 Ethernet Port ❷. Each connector uses two RJ45 Ethernet ports, with all pins internally tied together within the shelf. This design enables daisy chaining of shelves for communication and power management.

Withstand Voltage Test



- Locate the internal surge protection circuit with gas discharge tubes connected between input (L and N) and ground.
- Before performing the withstand voltage test, remove the ground screw (❶) of the surge (lightning protection) circuit.
- Make sure the screw is completely removed. otherwise, the test will not succeed.
- Perform the withstand voltage test as specified.
- After completing the withstand voltage test, reinstall the screw (❶).
- If the screw is not reinstalled, the module may experience surge voltage at the input, which could lead to damage.

Ventilation Requirements

- The power module must be installed in a well-ventilated area to ensure that its airflow path is unobstructed.
- The power module should be at least 50 mm of space between the front and rear of the module to ensure ventilation.
- Keep the ambient temperature, especially the front side of the Powershelf, between -5 °C and 45 °C.

Replacing the PSU Module

⚠ DANGER

HAZARD OF HOT SURFACE

Do not touch surface of the module when it is in operation.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

HAZARD OF EQUIPMENT DAMAGE

- Make sure the handle is in the open position before pushing the module into the frame.
- The lock frame of the rectifier module is installed on the right side of the PSU.

Failure to follow these instructions can result in injury or equipment damage.

NOTE: Removing a PSU or rectifier module from an active system will trigger a system alarm. After installing the replacement module, reset the system monitoring module.

The PSU or rectifier module can be unloaded or installed when the power system is in operation, which is convenient for installation and maintenance.

To replace,

1. Move the plastic latch on the front panel sideways to unlock, then gently pull the handle and slowly slide the module out of the slot while supporting it with your hand to prevent sudden drops.
2. Once the module is fully removed, place it back into the original packaging box for proper protection.

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