

**NetworkAIR[®]
Rack Air Removal
Unit**

ACF101BLK

**Installation and
Operation Manual**

APC[®]
www.apc.com

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General Information

Introduction

The American Power Conversion NetworkAIR[®] Rack Air Removal Unit removes heat generated by the exhaust of IT equipment contained in a NetShelter VX or NetShelter EP EIA 19-inch enclosure. The Rack Air Removal Unit, installed at the rear of the enclosure, removes warm air from the equipment in the enclosure. The three fans provide increased air flow needed to cool densely-packed equipment and allow air to bypass obstacles in the rear of the enclosure such as power and data cables. An optional duct kit removes the heat entirely from the data center.

Features

Features of the Rack Air Removal Unit:

- Variable fan settings — based on power load and user-definable exhaust temperature
- Dual input connectors — for redundant power
- Three individually fused fans — allows unit to be used for redundancy or higher capacity
- Alarm LEDs — system status, fan status, and thermal control status
- Duct kit — for removal of heat from the air-conditioned space (optional)
- Integrated smoke detector (optional)
- APC environmental room managers — for remote control and monitoring of the Rack Air Removal Unit (optional)

Safety Information



For computer-room use only.

Install the Rack Air Removal Unit only on racks that are loaded with equipment, counter-weighted, or stabilized to avoid tipping of the rack.

Inspect the Rack Air Removal Unit for damage before installation.

Disconnect power to the Rack Air Removal Unit before installing it into the rack. Failure to do so may result in personal injury or damage to equipment.

Do not apply power to the unit until the installation is complete. The Rack Air Removal Unit contains moving parts, which are potentially hazardous when operated outside of the rack.

Do not attempt to move a heavily-loaded enclosure by yourself. Doing so introduces risk of injury due to muscle strain or to tipping of the enclosure. Fully-loaded enclosures require at least two people to move safely.

Do not attempt to install the Rack Air Removal Unit by yourself. Doing so introduces risk of injury due to muscle strain or to tipping of the enclosure. The Rack Air Removal Unit requires at least two people to install safely.

Check that the power cord plugs and sockets are in good condition before installation.

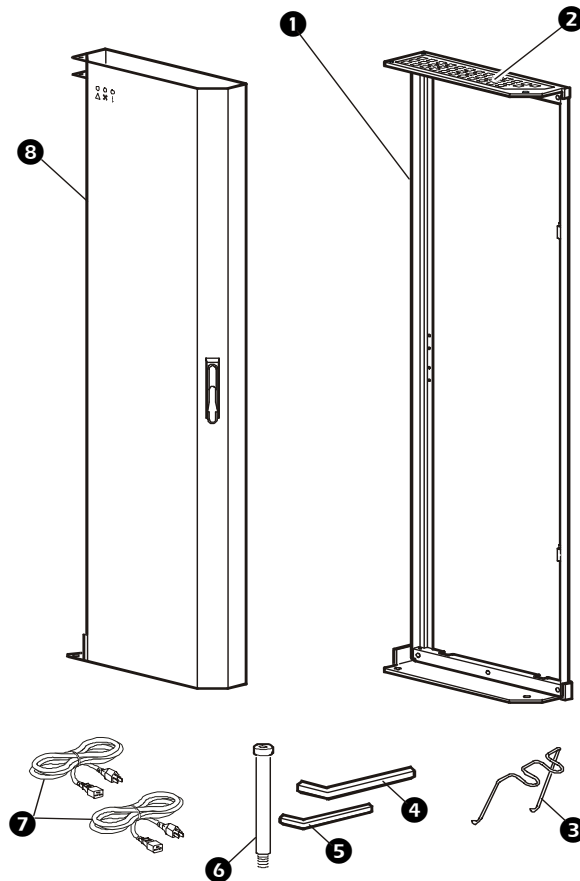
Connect the Rack Air Removal Unit to a three-wire, 115-volt outlet. The outlet must be connected to appropriate branch circuit/mains protection (fuse or circuit breaker). Connection to any other type of outlet may result in a shock hazard.

This equipment contains potentially hazardous voltages. Do not attempt to disassemble the unit.

Always install and operate the Rack Air Removal Unit as shown in this manual.

Before You Begin

Inventory



Item	Description	Quantity
1	Fan frame	1
2	Exhaust vent	1
3	Cord retainer	1
4	M5 Allen wrench	1
5	5/32" Allen wrench	1
6	Hinge screw	1
7	Power cords (NEMA 5-15)	2
8	Fan assembly	1

Receiving inspection

Inspect the package and contents for shipping damage, and make sure that all parts were sent. Report any damage immediately to the shipping agent, and report missing contents, damage, or other problems immediately to APC or your APC reseller.

Overview

Tools required

You will need the following to install the Rack Air Removal Unit:

- 5/32" Allen wrench (provided)
- M5 Allen wrench (provided)

Overview of the installation procedure

The Rack Air Removal Unit is installed on the rear of a 19-inch EIA NetShelter VX or EP enclosure. With the enclosure in its final location and stabilized, remove the rear door(s) and replace them with the Rack Air Removal Unit. You will need at least 30 inches of clearance behind the enclosure to install the Rack Air Removal Unit. See the following section for the installation procedure.

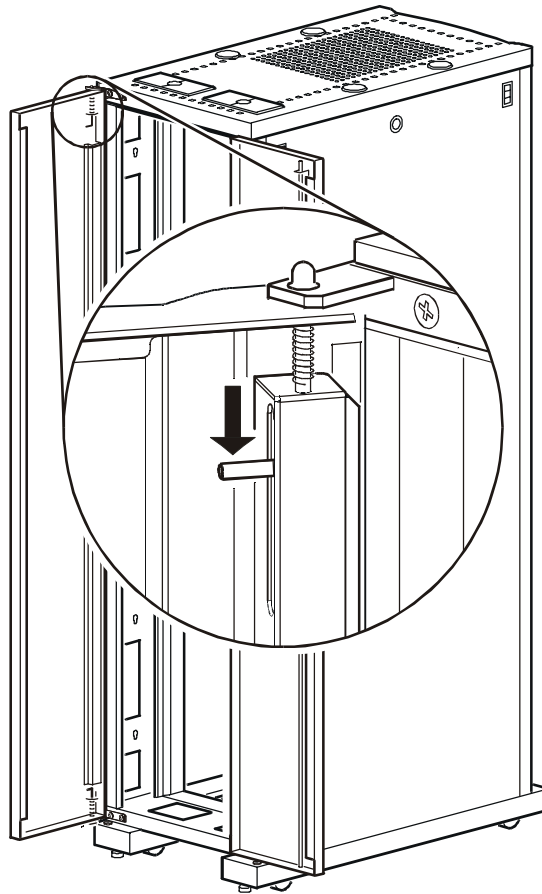
Installation

Remove the rear doors



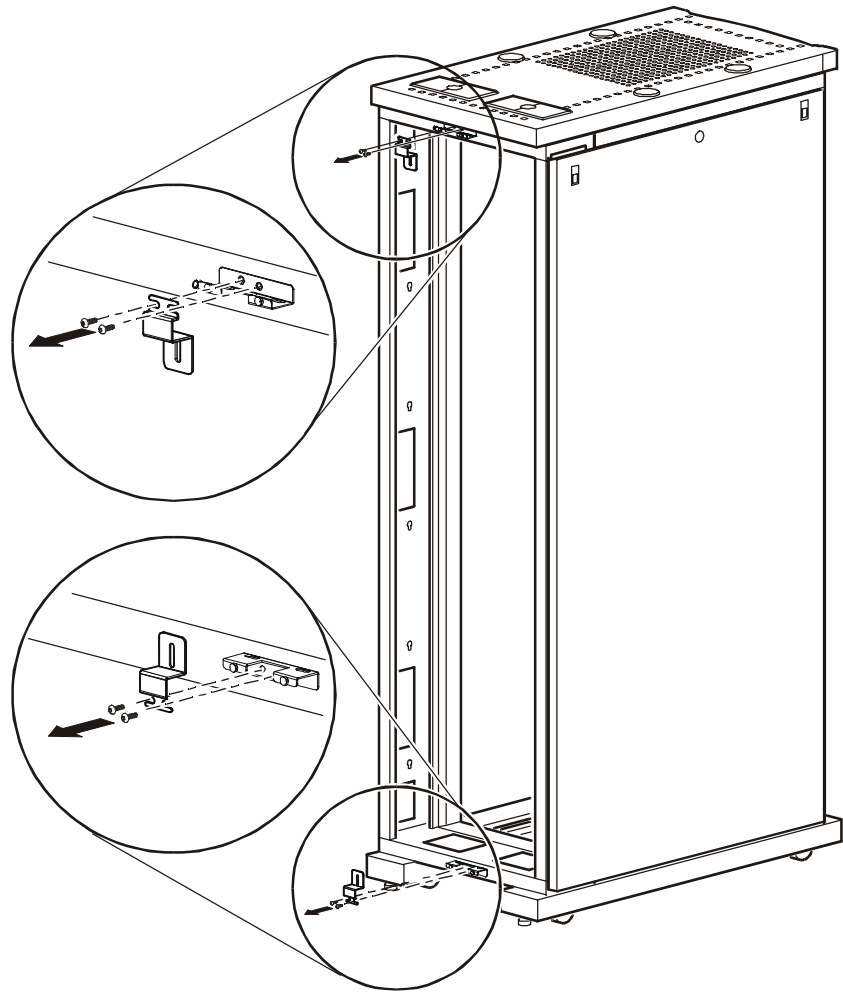
To avoid personal injury or damage to the enclosure, one person should support the door while another removes it from the frame.

1. If necessary, move the rack to allow for at least 30 inches of clearance to install the Rack Air Removal Unit.
2. Open the rear doors and pull down on the spring-loaded hinge pin attached to the top of the door. Lift each door from its frame and set safely aside.



3. Repeat this step with the other rear door.

4. Using the included M5 Allen wrench, remove the door bumpers at the top and bottom of the door frame.



Install the fan frame

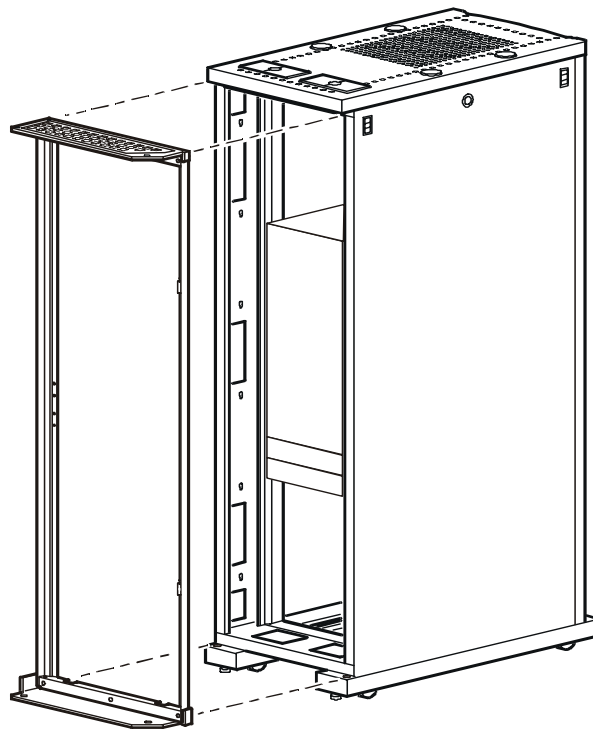


To avoid personal injury or damage to the enclosure, one person should support the fan frame while another places the fan frame onto the enclosure.

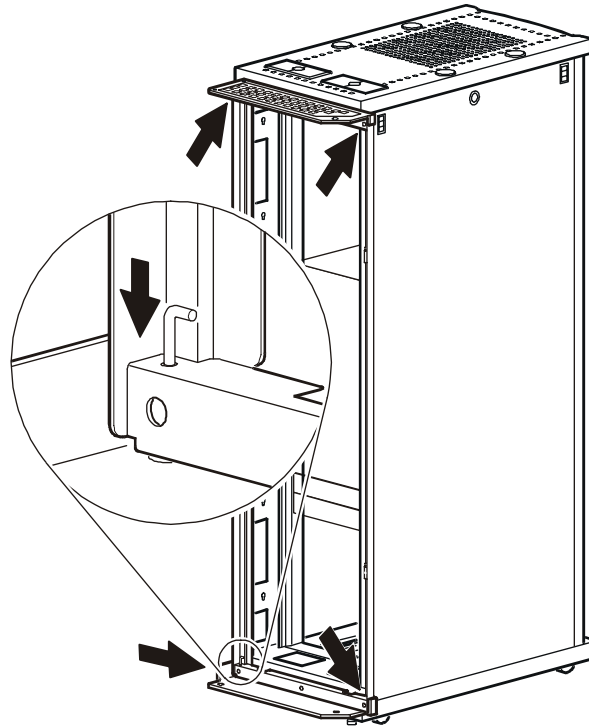


Install the Rack Air Removal Unit only on racks that are loaded with equipment or counter-weighted to avoid tipping of the rack.

1. With the exhaust vent at the top of the fan frame, align the four corners of the fan frame to the four corners of the enclosure. The spring-loaded pins at the bottom of the fan frame will line up with the hinge-pin brackets on the enclosure.



2. Insert the spring-loaded pins at the bottom of the fan frame into the holes.



3. Pull the spring-loaded pins at the top of the fan frame and release the pins into the holes.

Install the fan assembly

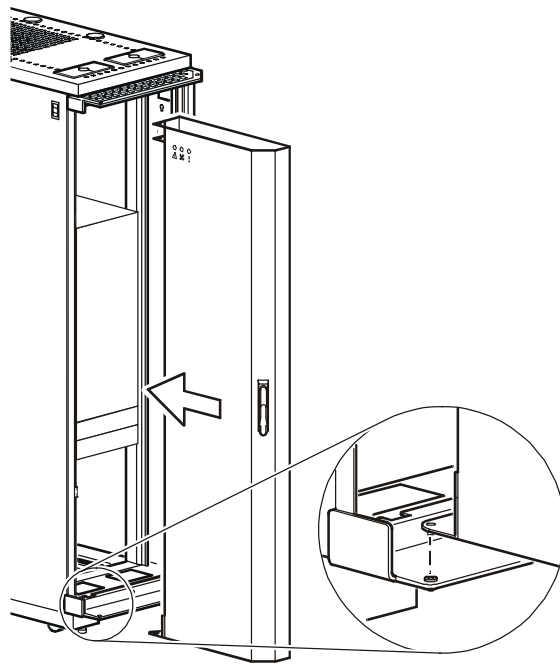


To prevent the enclosure from tipping, all four pins must be engaged in the enclosure frame before installing the fan assembly.

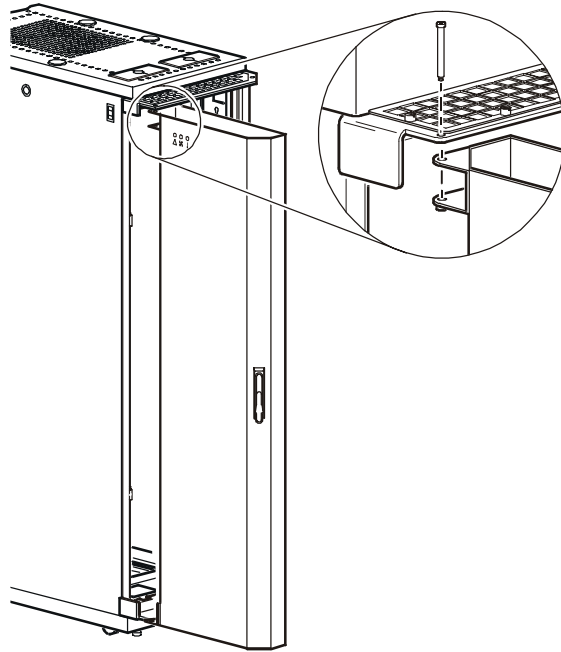


To avoid personal injury or damage to the Rack Air Removal Unit or the enclosure, two people should support the fan assembly while another places the fan assembly onto the enclosure.

1. Align the lower pin with the hole in the hinge pin bracket on the fan frame and insert the pin into the hole.



2. Align the upper hinge hole with the hole in the upper hinge pin bracket and insert the hinge screw into the holes.

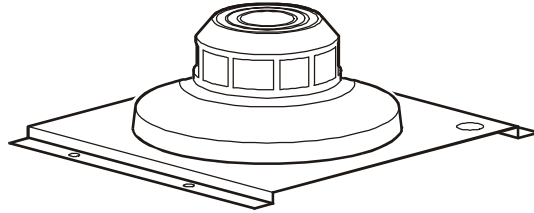


3. Tighten the hinge screw with the included 5/32" Allen wrench.

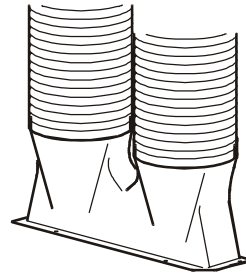
Optional Items

American Power Conversion offers additional products (not included) for the Rack Air Removal Unit:

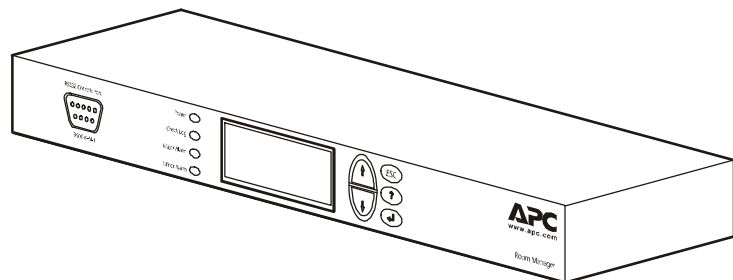
- Smoke Detector Kit (ACF121) — mounting plate and smoke detector for use inside the Rack Air Removal Unit.



- Air Duct Kit (ACF120) — for removal of heat from the air-conditioned area. If using the optional duct kit with the temperature setpoint mode, you will need to monitor the room temperature for the first 24 hours, and adjust your setpoint to maintain the proper temperature differential (see “How to set the fans based on temperature” on page 16).



- APC environmental room managers (AP9320) — Monitoring unit and A-Link connections for monitoring and controlling the Rack Air Removal Unit from a remote location.



Operation

Start-up

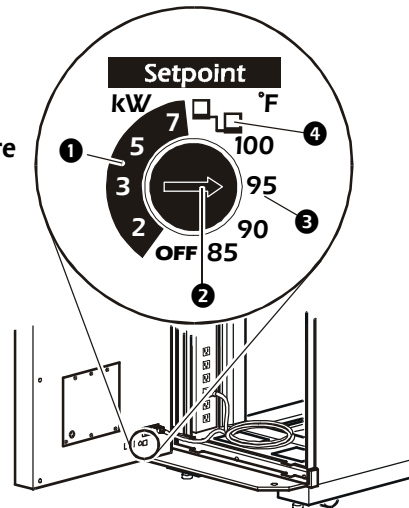


Do not remove the air intake guards.

Warning

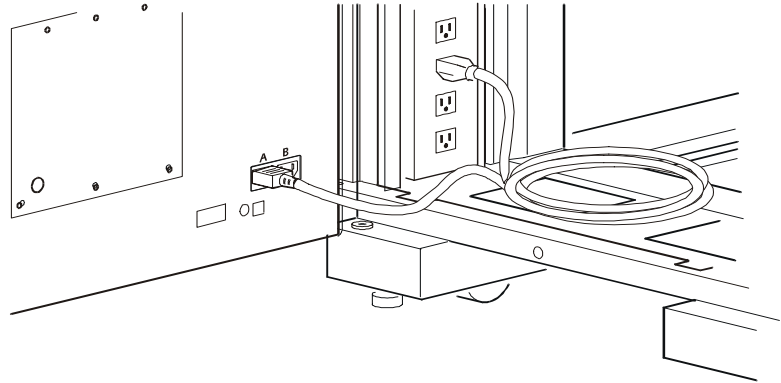
The Rack Air Removal Unit has a rotary setpoint dial **2** for setting the fan speed based on either the wattage output of the equipment in the rack or the exhaust temperature. The left side of the dial **1** is for setting the fan speed based on wattage output of the equipment. The right side of the dial **3** is for setting the fan speed based on the desired exhaust temperature. The Rack Air Removal Unit can also be set remotely by setting the dial on remote **4** and connecting to APC environmental room managers.

- 1** Wattage
- 2** Dial
- 3** Temperature
- 4** Remote



Connect the power supply

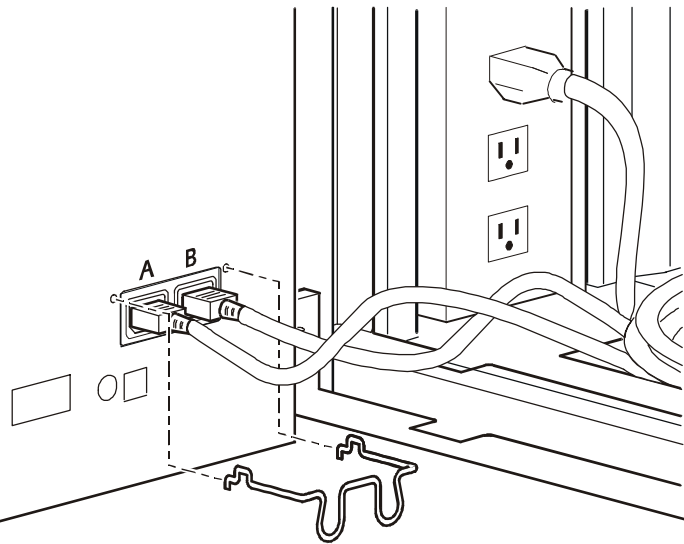
1. Make sure the setpoint dial is set to OFF.
2. Using one of the supplied power cords, connect the female end to the "A" input socket on the inside of the unit. Plug the male end into a power-protected socket. Ensure that there is adequate power for the fans to run at 100% (120 V / 9 amp). The UPS in the rack must be sized properly to run this unit.



Warning

Use the Rack Air Removal Unit only with a 3000kW UPS or higher. UPS should not be loaded above 80% when using the Rack Air Removal Unit.

3. To provide redundant power to the unit, use the "B" input socket to connect to a second source of protected power.
4. Attach the cord retainer to lock the cords in place.



Note

Cords may be bundled and tie-wrapped to provide clearance for other components.

To check operation of the unit:

1. Apply power to the fans by turning the temperature setpoint dial ② from the OFF position to one of the four exhaust temperature settings ③.
2. Make sure the fans are moving.
3. Turn off the unit.



Note

If no air is flowing from the Rack Air Removal Unit, check the power connection.

Temperature override

The Rack Air Removal Unit has a temperature override that will protect the equipment from overheating when in the kW mode only.

Disable the temperature override and set the dial to a kW setpoint to have the fans run at a constant speed. This will ensure that the fans stay at a constant speed even if the temperature in the enclosure rises.



Enable the temperature override to increase the fan speed automatically if the temperature in the rack rises above the setpoint.

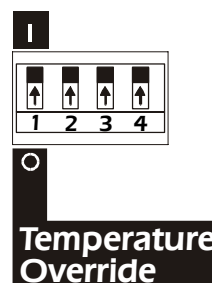


Note

This may have an impact on the airflow in the room if the ambient temperature rises substantially, such as in the case of a Computer Room Air Conditioner failure.

How to set the temperature override

The temperature override switch is recessed inside the space marked A-Link Address. Use a small tool such as a pocket screwdriver to set the DIP switch to the correct position. To enable the temperature override feature, set the first DIP switch to the ON position . When the override is enabled, the Rack Air Removal Unit switches the fan speed to bring the cabinet temperature below the override setpoint. Once the draw of the fan returns to the point of kW control the unit will switch back to normal operations. To disable the temperature override, set the first DIP switch to the OFF position . When the override is disabled, the Rack Air Removal Unit fans will stay at a constant speed even if the temperature in the enclosure rises.



Warning

When in kW mode and using a UPS that is 3000VA, disable the temperature override to prevent the power draw from exceeding the limitations of the UPS.

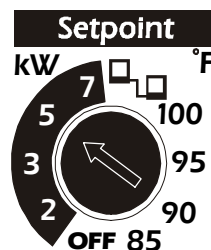


Note

When using the APC environmental room managers, you can set the temperature override setpoint remotely.

How to set the fans based on wattage

You can set the Rack Air Removal Unit to remove the heat generated by the equipment in the rack. Determine the wattage of your equipment and set the kW switch to that number.



Warning

Setting the kW setpoint too low could damage the equipment in the enclosure. If the amount of kW in your enclosure falls between two of the numbers on the setpoint dial, choose the higher number or set based on exhaust temperature.



Note

When the temperature override is enabled and the temperature in the rack rises above the temperature override setpoint, the Rack Air Removal Unit will automatically set the fan speed to bring the temperature below the setpoint.

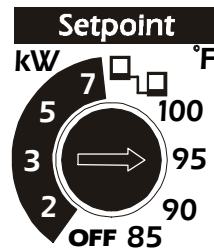


Warning

When in kW mode and using a UPS that is 3000VA, disable the temperature override to prevent the power draw from exceeding the limitations of the UPS. The UPS should not be loaded above 80% when using the Rack Air Removal Unit.

How to set the fans based on temperature

There are three temperature probes located in the exhaust vent of the Rack Air Removal Unit that measure the exhaust air temperature. The unit will increase or decrease the speed of the fans to keep the exhaust at the desired temperature. Set the dial to the expected exhaust temperature based on the inlet temperature to the equipment and the temperature differential of the equipment. (The temperature differential is the rise in temperature between the inlet air and the exhaust air after it passes through the equipment.) Refer to your equipment manual to determine the temperature differential.



Note

When the temperature override is enabled and the temperature in the rack rises above the temperature override setpoint, the Rack Air Removal Unit will automatically set the fan speed to bring the temperature below the setpoint.

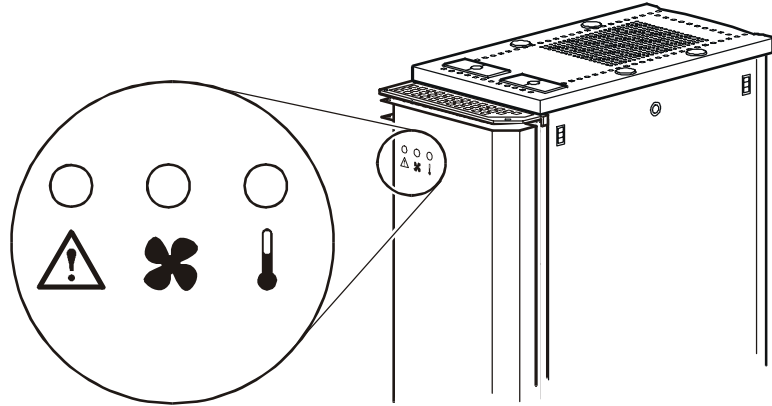


Warning

When using a UPS that is 3000VA, disable the temperature override to prevent the power draw from exceeding the limitations of the UPS. The UPS should not be loaded above 80% when using the Rack Air Removal Unit.




Alarm Settings

The Rack Air Removal Unit has three LEDs on the front of the door that indicate whether the system is in an alarm state.



LED legend

The following chart shows what each alarm indicates:

LED	 System Status	 Fan Status	 Thermal Control Status
Description	Indicates a problem with one of the controller boards. The fans will default to high speed when there is a board failure to keep air moving through the enclosure.	Indicates that one of the fans is not operating properly — the remaining fans will speed up to compensate.	Indicates that the temperature has risen above the set exhaust temperature and cannot be brought back down to the setpoint.
Green	System OK	Fans OK	Temperature within range
Green Flashing			Exhaust temperature has exceeded the temperature override setpoint (only used in kW mode)
Red	Control Failure	Fan Failure (remaining fans operate at full speed)	High Temperature (the unit has lost thermal control)
Red Flashing		Smoke Alarm (optional)	

How to Communicate Using the A-Link

The Rack Air Removal Unit can be used with APC environmental room managers that can monitor and control the unit.

Connect the APC environmental room managers to the Rack Air Removal Unit by plugging the connector into the A-Link connection.

How to connect to the A-Link

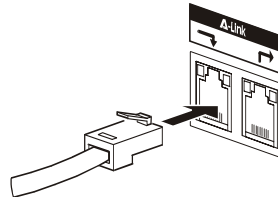
The Rack Air Removal Unit has two connections (IN and OUT) for cascading connections. The Rack Air Removal Unit must be given an address to communicate with the APC environmental room managers. The address DIP switch is recessed inside the space marked A-Link Address. Use a small tool such as a pocket screwdriver to set the DIP switch to the correct position.

To remotely monitor the Rack Air Removal Unit:

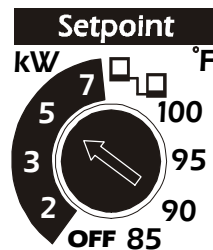
1. Set the second, third and fourth DIP switches to give the Rack Air Removal Unit a unique A-Link address of your choice.



2. Plug the device into the A-Link “IN” connector.



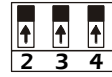
3. Turn the setpoint dial to the desired exhaust temperature or enclosure wattage.



The APC environmental room managers will be able to monitor the temperature and the alarms on the Rack Air Removal Unit.

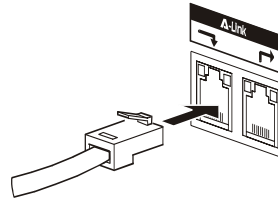
To remotely control the Rack Air Removal Unit:

1. Set the second, third, and fourth DIP switches to give the Rack Air Removal Unit a unique A-Link address of your choice.

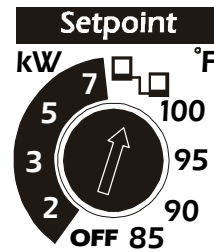


**A-Link
Address**

2. Plug the APC environmental room managers into the A-Link “IN” connector.



3. Turn the temperature setpoint dial to REMOTE.



The APC environmental room managers will be able to set and monitor the temperature and the wattage of the Rack Air Removal Unit and monitor it for any alarms.

Warranty and Service

Limited warranty

APC warrants the Rack Air Removal Unit to be free from defects in materials and workmanship for a period of two years from the date of purchase. Its obligation under this warranty is limited to repairing or replacing, at its own sole option, any such defective products. This warranty does not apply to equipment that has been damaged by accident, negligence, or misapplication or has been altered or modified in any way. This warranty applies only to the original purchaser.

Warranty limitations

Except as provided herein, APC makes no warranties, express or implied, including warranties of merchantability and fitness for a particular purpose. Some jurisdictions do not permit limitation or exclusion of implied warranties; therefore, the aforesaid limitation(s) or exclusion(s) may not apply to the purchaser.

Except as provided above, in no event will APC be liable for direct, indirect, special, incidental, or consequential damages arising out of the use of this product, even if advised of the possibility of such damage.

Specifically, APC is not liable for any costs, such as lost profits or revenue, loss of equipment, loss of use of equipment, loss of software, loss of data, costs of substitutes, claims by third parties, or otherwise. This warranty gives you specific legal rights and you may also have other rights, which vary according to jurisdiction.

Obtaining service

To obtain support for problems with your Rack Air Removal Unit:

1. Note the serial number and date of purchase. This is found on the back of the Fan Assembly.
2. Contact Customer Support at a phone number on the back cover of this document. A technician will try to help you solve the problem by phone.
3. If you must return the product, the technician will give you a return material authorization (RMA) number. If the warranty expired, you will be charged for repair or replacement.
4. Pack the unit carefully. The warranty does not cover damage sustained in transit. Enclose a letter with your name, address, RMA number and daytime phone number; a copy of the sales receipt; and a check as payment, if applicable.
5. Mark the RMA number clearly on the outside of the shipping carton.
6. Ship by insured, prepaid carrier to the address provided by the Customer Support technician.

There are no customer serviceable items on the Rack Air Removal Unit. Do not attempt to open or repair the Rack Air Removal Unit.

Life-Support Policy

General policy

American Power Conversion (APC) does not recommend the use of any of its products in the following situations:

- In life-support applications where failure or malfunction of the APC product can be reasonably expected to cause failure of the life-support device or to affect significantly its safety or effectiveness.
- In direct patient care.

APC will not knowingly sell its products for use in such applications unless it receives in writing assurances satisfactory to APC that (a) the risks of injury or damage have been minimized, (b) the customer assumes all such risks, and (c) the liability of American Power Conversion is adequately protected under the circumstances.

Examples of life-support devices

The term *life-support device* includes but is not limited to neonatal oxygen analyzers, nerve stimulators (whether used for anesthesia, pain relief, or other purposes), autotransfusion devices, blood pumps, defibrillators, arrhythmia detectors and alarms, pacemakers, hemodialysis systems, peritoneal dialysis systems, neonatal ventilator incubators, ventilators (for adults and infants), anesthesia ventilators, infusion pumps, and any other devices designated as “critical” by the U.S. FDA.

Hospital-grade wiring devices and leakage current protection may be ordered as options on many APC UPS systems. APC does not claim that units with this modifications are certified or listed as hospital-grade by APC or any other organization. Therefore these units do not meet the requirements for use in direct patient care.

Specifications

Item	ACF101
Electrical	
Power source	120 VAC; 60 Hz
Rated current	9 A
Compliance	UL/cUL
Physical	
Physical dimensions of fan assembly (h × w × d)	76.20 × 23.93 × 7.0 in (193.55 × 60.78 × 17.78 cm)
Net weight (unit only)	145 lb (65.77 kg)
Shipping weight	210 lb (95.27 kg)
Shipping dimensions	29.5 × 23.5 × 81 in (74.93 × 59.69 × 205.74 cm)
Airflow (non ducted)	
2 kW	320 CFM
3 kW	400 CFM
5 kW	800 CFM
7 kW	1120 CFM



APC Worldwide Customer Support

Customer support for this or any other APC product is available at no charge in any of the following ways:

- Visit the APC Web site to find answers to frequently asked questions (FAQs), to access documents in the APC Knowledge Base, and to submit customer support requests.
 - **www.apc.com** (Corporate Headquarters)
Connect to localized APC Web sites for specific countries, each of which provides customer support information.
 - **www.apc.com/support/**
Global support with FAQs, knowledge base, and e-support.
- Contact an APC Customer Support center by telephone or e-mail.
 - Regional centers:

APC headquarters U.S., Canada	(1)(800)800-4272 (toll free)
Latin America	(1)(401)789-5735 (USA)
Europe, Middle East, Africa	(353)(91)702020 (Ireland)
Japan	(81) (0) 3 5434-2021 Guidance 3

- Local, country-specific centers: go to **www.apc.com/support/contact** for contact information.

Contact the APC representative or other distributor from whom you purchased your APC product for information on how to obtain local customer support.

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