

### NetworkAIR<sup>®</sup> FM Precision Air Conditioner

**Chilled Water** 

Installation





This manual is available in English on the enclosed CD. Dieses Handbuch ist in Deutsch auf der beiliegenden CD-ROM verfügbar. Deze handleiding staat in het Nederlands op de bijgevoegde cd. Este manual está disponible en español en el CD-ROM adjunto. Ce manuel est disponible en français sur le CD-ROM ci-inclus. Questo manuale è disponibile in italiano nel CD-ROM allegato. 本マニュアルの日本語版は同梱の CD-ROM からご覧になれます。 Instrukcja Obslugi w jêzyku polskim jest dostêpna na CD. O manual em Português está disponível no CD-ROM em anexo. **Инструкция по использованиюна русском языке прилагается на диске (CD)**. 您可以从包含的 CD 上获得本手册的中文版本。

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# **General Information**

# Overview

### Save these instructions

This manual contains important instructions that must be followed during the installation of this equipment.

### Safety symbols used in this manual



Indicates an electrical hazard, which, if not avoided, could result in injury or death.



Indicates a hazard, which, if not avoided, could result in severe personal injury or substantial damage to product or other property.



Indicates a potential hazard, which, if not avoided, could result in personal injury or damage to product or other property.



Indicates a heavy load that should not be lifted without assistance.



Indicates important information.



Indicates a hazard, which, if not avoided, could result in personal injury or damage to product or other property.

### Cross-reference symbols used in this manual



Indicates that more information is available on the same subject in a different section of this manual.



Indicates that more information is available on the same subject in a different manual.

# Safety



All work should be performed by APC authorized personnel only.

Follow all local and national codes when installing this system.

Only a licensed plumber may connect the FM water lines.

For indoor use only



Keep your hands, clothing, and jewelry away from moving parts.

Check the Module for foreign objects before closing the doors and starting the unit.



This equipment is heavy. For safety, at least two people must be present when moving or installing.

Heavy

The Module has a high center of gravity. Use extreme caution when unpacking and moving the Module.

When using a forklift to move the equipment, make sure to lift only from the bottom.



Only a licensed electrician or APC Field Service Engineer may connect the FM to UPS power.

Only a licensed electrician may connect the FM to utility power.

This unit has multiple power sources. Disconnect all energy sources before servicing the unit.

Do not wear jewelry when working near energized components.

# **Receiving the Equipment**

### Receiving and inspecting the Module

Your NetworkAIR<sup>®</sup> FM Precision Air Conditioner has been tested and inspected for quality assurance prior to shipment from APC. To ensure that the Module has not been damaged during transit, carefully inspect both the exterior and interior of the equipment immediately upon receipt.

Verify that all parts ordered were received as specified and that the Module is the correct size and voltage.

**Inspect the exterior of the packaging.** Locate the **shock indicators** on the exterior of the packaging. The shock indicators change from white to red when activated. Note on the bill of lading any indications that the shock indicators have been activated.

**Filing a claim.** If damage is identified on receipt of the Module, note the damage on the bill of lading and file a damage claim with the shipping company. Contact APC NetworkAIR technical services for information on how to file a claim with the shipping company. The shipping claim must be filed at the receiving end of the delivery.





In case of shipping damage, contact the APC NetworkAIR technical services department at **1 (888) 695-6500**.

### Storing the Module before installation

If the Module will not be installed immediately, store it in a safe place, protected from the elements.



Leaving the Module uncovered and exposed to the elements can cause damage and void the factory warranty.

### Moving the Module

**Moving the Module through door openings.** Depending upon your installation, you may need to modify the Module to fit through smaller door openings.

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Refer to the dimensional drawing below and the section "Dimensions of the Equipment" on page 17" to help determine if this is necessary.

If modifications are necessary, you can decrease the width of the Module by removing the front kick panel, hard points, and main circuit breakers.

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See "Removing the Doors and Panels" on page 27 for more information.

### Minimum door opening



When calculating height, be sure to add the height of your moving device.



Move the Module to its final location. Select the appropriate tools for moving the Module. Each site will have different needs and considerations.



Furniture

dollies (2)

Forklift

Roller bars

Wheeled lever









Do not attempt to move the Module without assistance.



The Module has a high center of gravity. Use extreme caution when unpacking and moving the Module.



When using a forklift to move the equipment, make sure to lift only from the bottom.

### **Door locks**

The left- and right-hand doors can be locked using the key located inside the front-left door.



# **Component Identification**

#### **Downflow Module — exterior**



### Downflow Module — interior



- Fan interlock switch (2)
- 2 Cooling coil
- 3 Condensate pan
- Motor and fan assembly (2)
- **5** 3-way ball valve
- 6 Actuator
- Humidifier (optional)

- **8** Condensate pump (optional)
- **9** User interface box
- **•** Firestat (optional)
- ① Steam head
- Electrical panel
- B Electric reheat coil (optional)
- **1** Front air blocks

### Upflow Module — exterior



- Duct collar (optional)
- **2** Removable side panel
- S Kick-panel
- Front door handle

- Main power interrupt switch
- **6** Display interface
- **7** Front door
- 8 Door header

### Upflow Module — interior



- Motor and fan assembly (2)
- 2 Steam head
- Fan interlock switch (2)
- Condensate pan
- **5** 3-way ball valve
- 6 Air filters
- Condensate pump (optional)
- 8 Humidifier (optional)

- **9** Power distribution box
- **O** Firestat (optional)
- **1** User interface box
- D Front air blocks
- Cooling coil
- Electric reheat coil (optional)
- **B** Electrical panel

### **Electrical panel components**



0	Input circuit breaker—UPS power	₿	Controller board
0	Input circuit breaker—main power	14	DIP switches
€	Fan 1 fuses	€	DB25 (user interface)
4	Fan 2 fuses	C	Console port
Ø	Controller fuses	Ð	Display interface connection
6	Heat 1 fuses	13	Jumper board
0	Heat 2 fuses	Ø	AC line reactors (2)
8	Humidifier fuses	20	Humidifier contactor
9	Motor inverter/frequency controllers	2	Heat 1
0	Control transformer	Ð	Heat 2

Smoke detector

Card slot

0

- 2
  - Reheat SCR control B

NetworkAIR FM Installation

### User interface box



- Programmable Customer Input/Output Modules (PCIOM) #3
- 2 CAN bus input
- **3** CAN bus output
- **4** PCIOM #4
- **5** Terminator
- **6** User interface card
- **7** Bulkhead Ethernet connection
- **8** Bulkhead controller interface connection
- Module CAN bus component (temp, humidity, and pressure sensors)

- Module CAN bus output (PCIOM)
- **①** System CAN bus output
- **②** System CAN bus input
- **B** Ethernet port
- Knock-outs
- D PCIOM #1
- **©** PCIOM #2
- LED I/O indicators

# **Piping Diagram**



### **Room preparation**

During the design of the data center, consider ease of entry for the equipment, floor loading factors, and accessibility to piping and wiring.

Seal the room with a vapor barrier to minimize moisture infiltration. (Polyethylene film is recommended for ceiling and wall applications.) Apply rubber- or plastic-based paints to concrete walls and floors.

Insulate the room to minimize the influence of exterior heat loads. Use the minimum required amount of fresh air (to be mixed with recirculated air) to comply with local and national codes and regulations. Fresh air imposes extreme load variation on the cooling equipment from summer to winter and causes increased system operating costs.

**Raised floor.** A computer room with a raised floor plenum for air distribution should have at least 12 inches (300 mm) of clear space between the raised floor and sub-floor for air conditioners below 15-ton capacity (50 kW). Pay special attention to the location of pipe chases, electrical conduits, and other under-floor obstructions. These objects can block air circulation and cause air pressure drops, which reduces system efficiency, causing possible hot spots in the room. The minimum clear area for larger rooms should be 18 inches (460 mm) when air conditioners of 15-ton capacity (50 kW) and larger are used.

### Air distribution

**Downflow discharge.** If the installation location of the Module has a raised floor, the space between the raised floor and sub-floor can be used as an air distribution plenum. Downflow discharge Modules can be installed directly on the raised floor after ensuring that the floor can support the Module. A floorstand can be used if the floor cannot support a Module.

**Raised floor.** When installing Modules on a raised floor, maintain the correct amount of free area to allow proper air movement.

Check for under floor obstructions that might prevent conditioned air from being properly distributed throughout the room.

Install an adequate number of perforated floor tiles to allow for proper air distribution in the conditioned space. Allow additional relief near heavier heat loads.

**Upflow discharge.** In rooms designed for upflow discharge systems, air is distributed through a supply duct or through a discharge plenum into the conditioned space. The same Module location considerations for a downflow discharge system also apply to upflow discharge systems.



All Modules are designed for a maximum of 0.5 inches (125 Pa) of external static pressure.

**Sub-base.** When using an upflow Module, a sub-base is required. It will allow routing of supply and discharge elements, such as refrigerant, water, power, and drain lines.

### Incoming power supply requirements



The Module requires three-phase electrical service. Electrical service must conform to national and local electrical codes and regulations. The Module must be grounded.

### Service access

An area of 36 inches (914 mm) of clear floor space in front of the Module is required for service. All required maintenance can be performed from the front of the Module.



### Supporting the Module

Place the downflow Module either directly on the raised floor or on a floorstand.



Consult your raised floor manufacturer for weight capacities if you are installing the module directly on the raised floor.

# Weight

### Module Weight Unpacked

1200 lbs 544 kg

# **Dimensions of the Equipment**



### Doors, panels, and main circuit breaker removed

\*Dimensions are shown in inches (with millimeters in parentheses)

### **Downflow Module**



**Upflow Module** 



\*Dimensions are shown in inches (with millimeters in parentheses)

#### NetworkAIR FM Installation



### Air outlets—downflow Module bottom pan

Piping access location in bottom pan-top view



\*Dimensions are shown in inches (millimeters)

# Installation

## How to Remove the Doors and Panels

ITo decrease the depth of the Module, remove the front doors, front fascia, kick panel, rear panels, and main circuit breaker. This section explains these procedures.



Doors and panels are heavy. For safety, at least two people must lift themwhen removing or installing them.

### Removing the outer front doors

- 1. Open the door that you want to remove.
- 2. Pull down on the spring-loaded hinge pin located in the top of the door. Tilt the door forward and lift it up to release it from the lower hinge pin.



Before removing the left door, remove the display interface and the main power interrupt switch connections.



### Removing the center front door

- 1. Open the left- and right-hand doors to gain access to the center panel release mechanisms.
- 2. Pull down on the spring-loaded hinge pins located in the top of the door. Tilt the door forward and lift it up to release it from the lower hinge pin.



### Removing the front fascia

To remove the front fascia, remove the five Torx<sup>®</sup> screws located at the top of the module and the two Torx screws located on the front.



#### Removing the kick panel

To remove the kick panel, remove the eight Torx screws from the top flange of the kick panel.



### Removing and installing side panels

You may need to remove the side panels to access internal components or to join Modules.

- 1. Slide both panel latches down and pull the top of the panel toward you.
- 2. Lift the panel up and out of the channel located at the bottom of the frame.



Reverse the procedure when installing side panels.



### Removing the rear panels

To remove the rear panels:

- 1. Remove the cap plugs (six per panel).
- 2. Remove the Torx screws (six per panel).



### **Removing the Main Circuit Breaker**

When moving the Module, it may be necessary to modify it to fit through smaller door openings. To decrease the depth of the Module to 31.5 inches (800 mm), the main circuit breaker, located in the electrical panel, must be removed.



Before removing any electrical components, be sure to note the orientation of the electrical component and label all wires with their location.



Only a licensed electrician may remove or install the circuit breakers.

### How to remove the main circuit breaker

- 1. Mark and disconnect the wires at the main circuit breakers.
- 2. Remove the main circuit breakers by removing the Torx screws (four per breaker).
- 3. Reverse the above procedure when reinstalling.



Refer to the torque specification ratings table below when reinstalling the circuit breakers.



### **Torque Specification Ratings—Circuit Breakers**

Breaker type	Amp Rating	AWG size	in lb (N-m)
S3	100 A and less	—	50 (5.65)
<b>S</b> 3	more than 100 A	—	275 (31.08)
T1		14-10	20 (2.26)
T1	_	8	40 (4.52)
T1	_	8-10	45 (5.09)

### Place the Module In Its Final Location

### Plenums and ducting



For instructions on how to install the sub-base, floorstand, and plenum see the instructions supplied with the equipment.

**Sub-base.** A sub-base raises the height of the unit by 10 in (254 mm) on upflow units to provided access for electrical and piping connections. Front and rear access panels on the sub-base are removable.

**Floorstand.** The floorstand raises the height of the unit above the subfloor to match the height of the raised floor. Floorstands are equipped with air deflectors and turning vanes for optimal air distribution.

**Discharge plenum.** Discharge plenums are available for upflow and downflow systems. Upflow configurations are available with front, 2-sided, or 3-sided discharge grills. Downflow plenums raise the Module 14 in (356 mm), and the air is discharged horizontally from the front of the plenum. Discharge air should be ducted down cold aisles.

**Top-return plenum.** Top-return plenums provide a connection to external ductwork for return air. Access is provided for filter replacement.

### **Mechanical Connections**

Water. Install shutoff valves for routine service and emergency isolation of the Module.

Insulation. Insulate water lines to protect personnel and to minimize condensation.



**Humidifier.** The humidifier water supply connection is a 1/4-inch compression fitting (supplied with the Module). Water supply pressure should be between 29 psi (200 kPa) and 87 psi (600 kPa) for proper humidifier operation. A water filter can be used to extend the life of the canister. Do not use hot, softened, demineralized, or deionized water.



**Condensate pump.** The pump is factory-wired and piped internally to the condensate pan and humidifier discharge. The pump has a maximum lift of 44.3 ft (13.5 m). The pump has its own internal check valve to prevent the pump from short-cycling. The pump also uses an on-board condensate high level float switch, which is wired into the Module alarm input for local and remote alarm capabilities.

*Condensate pump drain connection:* Attach the drain line to the 7/8-inch O.D. condensate drain tube, and secure it with a hose clamp. Route the drain line through an opening in the bottom of the Module to an open drain.



Use code-compliant piping practices when installing the condensate drain line to an open drain.

*Overflow condensate drain pipe*: This drain, located in the front-right corner of the Module, provides a controlled overflow path and should be piped to an independent drain system.



This connection must be left open.





### **Electrical and Communication Connections.**

The electrical connections required in the field are:

- Controls (Can BUS)—optional
- Chilled water flow control switch-optional
- PCIOM (programmable customer input/output module)-optional
- Communication (Building Management System)-optional
- Main power
- UPS power—optional
- Web card (Ethernet)—optional



Refer to the electrical schematic, located on the lid of the electrical box, for all electrical connections.

All electrical connections must be in accordance with national and local codes.

Refer to the Module nameplate for voltage and current requirements.

A power disconnect is required to isolate each Module for maintenance and service.

All low-voltage connections, including data and control connections, must be made with properly insulated wires. The low voltage connections must have 600 V insulation.



Potentially dangerous and lethal voltages exist within this Module. More than one disconnect switch may be required to energize or de-energize this equipment. Observe all cautions and warnings. Failure to do so could result in serious injury or death. Only qualified service and maintenance personnel should attempt to work on this equipment.



Use a voltmeter to ensure that power is turned off before making any electrical connections.



Three-phase electrical service is required. Electrical service must conform to national and local electrical codes. The Module must be grounded to an earth ground. Check the Module nameplate for correct minimum circuit ampacity (MCA) and maximum overcurrent protection (MOP).



All input and output connections should be wired as Class 2 circuits

Depending on the Module configuration, additional control connections may be required for the CAN Bus, remote communications through APC Network Management Card support, or traditional equipment-monitoring software.



### **User Interface card**



### Temperature and relative humidity probe.

A temperature and relative humidity probe kit comes with each unit. Additional probes can be purchased and connected together with A-link cables.



See the "Temperature and Humidity Probe AP9520T, AP9520TH" installation manual, supplied with the kit, to install and set up the temperature and relative humidity probe.

**Network management card—LAN connection.** Use CAT-5 cable to connect the Module (at the Ethernet port on the User Interface Card) to the LAN.




**Rope water detector (optional).** Additional rope and spot water detectors (a maximum of two each) can be installed as needed.



See the "Rope water detector" installation manual, supplied with the kit, for installation and set-up.



Flow control switch (optional). The flow control switch

should be installed on the chilled water supply line. Plug the harness of the flow switch into the plug labeled P55 located along the filter rail in the bottom of the Module.



### Input contact

Each Module can support up to 16 user-defined input contacts (with additional PCIOM cards). These contacts connect to sensors. Each contact monitors and responds to changes in the state of the associated sensor (open or closed).

### **Output relays**

Each Module supports up to 16 user-defined output relays (with additional PCIOM cards). Unlike input contacts, output relays send internal alarms and events to outside devices.

### Input and output card—PCIOM



<sup>\*\*\*50</sup> mA MAX (TOTAL)

### **Communication Connections**

The communication connections consist of the following:

- MOD bus
- CAN (Controller Area Network)
- Ethernet

### **CAN** connections

The CAN connection allows micro-controllers to communicate with one another. Each Module has a user-definable address that distinguishes one Module from another.

### Connect the CAN network

Each Module contains a user interface card. To enable the Modules to work as a Group, link each of the user interface cards, using the supplied cables or CAT-5 cables with RJ-45 connectors. A terminator is required at the CAN IN connector in the Main Module and the CAN OUT connector in the last Module in the Group.



**Assign the CAN address.** Assign the CAN address by setting the DIP switches on the controller board in the electrical box. The following chart shows proper DIP switch configuration settings.

		Switch number and position			
System number	Module	1	2	3	4
1	Main Module and Group Master	Off	Off	Off	Off
1	Expansion Module 1	Off	Off	Off	On
1	Expansion Module 2	Off	Off	On	Off
2	Main Module	Off	On	Off	Off
2	Expansion Module 1	Off	On	Off	On
2	Expansion Module 2	Off	On	On	Off
3	Main Module	On	Off	Off	Off
3	Expansion Module 1	On	Off	Off	On
3	Expansion Module 2	On	Off	On	Off
4	Main Module	On	On	Off	Off
4	Expansion Module 1	On	On	Off	On
4	Expansion Module 2	On	On	On	Off

**Note:** In order for the System to function properly, Expansion Modules must be assigned in increasing order as Expansion Modules are added.



### **Building Management System**





### Wiring configurations

Depending on the incoming voltage and the number of incoming power sources, it may be necessary to make modifications to the wiring of the three control transformers located in the Module's electrical box. Use the information in this section to determine your wiring configuration needs, and make the appropriate changes.



Potentially dangerous and lethal voltages exist within this Module. More than one disconnect switch may be required to energize or de-energize this equipment. Observe all cautions and warnings. Failure to do so could result in serious injury or death. Only qualified service and maintenance personnel should attempt to work on this equipment.

Use a volt meter to ensure that power is turned of before making any electric connections.

1. Remove the board cover



2. Remove the jumpers from the bottom of the board cover.



 Select the correct jumper according to the chart below and install it using the diagram on the right.

### 208/230 Modules

Jumper part number	Voltage
0W2540	208
0W2541	230

### 460/480 Modules

Jumper part number	Voltage
0W2545	460
0W2546	480



### **Incoming Power**



Three-phase electrical service is required. Electrical service must conform to national and local electrical codes. The Module must be connected to earth.

Check the nomenclature of the Module for correct Minimum Circuit Ampacity (MCA) and Maximum Fuse Size (MFS).

**Downflow Modules.** Run three-phase electrical service from the bottom left of the Module and into the access holes provided in the bottom-left side of the electrical control box. Terminate the conduit at the electrical box. Connect power cables to the main and UPS circuit breakers and ground lug.



**Upflow Modules.** Run three-phase electrical service from the bottom left of the Module and into the junction box located in the bottom of the Module. Terminate the conduit at the junction box. Connect power and ground cables to the terminal block.



**Dual-feed application** 



Single-feed application



# Startup and Commissioning

# **Display Interface**



Item	Function
Major Alarm LED	When red, a major alarm condition exists.
2 Minor Alarm LED	When yellow, a minor alarm condition exists.
Check Log LED	When yellow, at least one new major alarm or minor alarm or event has occurred.
Status LED	When green, the Module is on.
Liquid Crystal Display (LCD)	View alarms, status data, instructional help, and configuration items.
<b>6</b> Up and down arrow keys	Select menu items and access information.
<b>O</b> ESC key	Return to previous screen.
8 ENTER key	Open menu items and input changes to System and Module settings.
• HELP key	Display context-sensitive help. Press the HELP key for information about each option on the screen and for instructions on how to perform tasks.

### Scrolling status screens

The first time you apply power to the NetworkAIR FM Precision Air Conditioner the display initializes and runs an LED and alarm-tone test.

After start-up, the interface displays the firmware revision number (if the fast start-up is disabled). The display interface then scrolls automatically and continuously through the following nine screens of status information.

Status Screen Name	Status Information Displayed
Control Temp & Humidity	<ul> <li>Temperature and Humidity at the sensors being used to control the environment</li> <li>Remote Temperature and Humidity (optional)</li> <li>Humidity Control Method (dew point or relative humidity)</li> </ul>
Cool/ Dehum Demands	<ul> <li>Cool Demand %</li> <li>Note: If you have more than one cooling coil (i.e., DX and MultiCool), the demands are split</li> <li>Dehumidify Demand %</li> <li>Actual Output %</li> </ul>
Reheat Demand	<ul> <li>Reheat Status: On/Off (Steam, hot water, or hot gas only)</li> <li>Reheat Demand % (Electric SCR only)</li> </ul>
Humidify Demand	<ul><li>Humidify Demand %</li><li>Humidify Actual %</li></ul>
Group Status	<ul> <li>Number of Systems</li> <li>Setpoint Share: On/Off</li> <li>Demand Fighting: On/Off</li> </ul>
Group Status	<ul><li>System number</li><li>Role</li><li>State</li></ul>
Active Alarms	<ul> <li>Alarm number</li> <li>Module identifier</li> <li>Alarm name</li> <li>Time stamp</li> </ul>
Setpoints	<ul> <li>Cool °C (or °F)</li> <li>Reheat °C (or °F)</li> </ul>
Setpoints	• Dehumidify % RH • Humidify % RH

Press the up or down arrow key to interrupt the automatic scrolling and view a specific status screen. To return to the scrolling status screens, press the ESC key from the main menu screen.

### Main menu screen

On any top-level status screen, press the ENTER or ESC key to open the main menu screen.



If the display interface is inactive for ten minutes (the default delay), it will return to the scrolling status screens. To change this delay, use the **time-out** setting under the **Password** menu.

### Navigating the interface

**Selector arrows.** Press the up or down arrow key to move the selector arrow **1** to a menu option or setting. Press the ENTER key to view the selected screen or modify the setting.



**Continue arrows.** Continue arrows **2** indicate that additional options or settings are available on a menu or status screen. Press the up or down arrow key to view the additional items.



**Input arrows.** Input arrows **③** next to a selected setting indicate that the setting can be modified by pressing the up or down arrow key. Press the ENTER key to save the change or the ESC key to cancel the change.



### **Password entry**

The Module has two levels of password protection:

- User password for users who need to change basic and environmental settings
- Service password for users who need to modify settings that control the components in the Module or change advanced options

When you try to change any of the settings, the display prompts you to enter your password.

Service Password: \*\*\*\*\*\*\* User Password: APC\*\*\*\* The default value for both the **User** and **Service** password is **APC** (upper case). To enter your password, use the up or down arrow keys to scroll through the alphabet. At the desired letter, press the ENTER key to select the letter and move the cursor to the next letter position. After selecting the last letter of your password, press the ENTER key once more to submit your password.



Passwords are case-sensitive.

### Start the system

### Path: Main Menu > On/Off

To start the System, select the **On/Off** option on the main menu and change the setting to **On**. The System will run according to the current settings under **Control Environment**.

### **Change settings**

Use the up or down arrow key to move the selector arrow to the setting that you wish to change, and then press the ENTER key.

- List of choices. If the setting is a list of choices, an input arrow is displayed next to the setting. Press the up or down arrow key to select the choice you want, and then press the ENTER key to exit the input mode and save the setting. Press the ESC key to exit without saving.
- Numbers or text fields. If the setting is a number or text field, use the arrow keys to select the value of the first character, and press the ENTER key to move to the next. Press the ENTER key after the last character is set to exit the input mode and save the setting. Press the ESC key to exit without saving.

### Stop the system

### Path: Main Menu > On/Off

To stop the System, select the On/Off option on the main menu and change the setting to Off.



Change the setting to **Off** to shut down all modes of operation and the blower fan; the display and the controller continue to receive power.

For Systems with electric reheat, the blower fans may continue to operate for up to 60 seconds to purge heat from the System.

### Factory default settings

All the NetworkAIR FM Precision Air Conditioning Unit settings are controlled through the display interface on the front of the Main Module for each System. The factory default temperature is set at 72° F (22.2° C) in the cooling mode, and 68° F (20° C) in the reheat mode. The default deadband is set at 2° F (1.1° C).

After the FM Precision Air Conditioner is installed, verify that all components are working properly and that the Module is ready to begin operation. To commission the Module, the following inspections need to be completed:

- Initial
- Electrical
- Mechanical/chilled water
- User interface

After these inspections are complete, the Module is ready for the functional test and charging. Complete the following procedures to begin operation of the Module:

- Functional test
- Module charging

Complete the following two checklists and the Module is ready to begin normal operation:

- Start-up
- Final



Equipment must be properly de-energized and locked-out prior to performing any service on this equipment.

### **Initial inspection**

The initial inspection ensures that the Module has been securely mounted to the floor stand or subbase and that the air distribution system is properly installed. The room must be sealed with a vapor barrier and the Module must be free of damage.



To perform the inspection, see "Initial Inspection Checklist" on page 51.



Do not run service utilities in front of the blower outlets.



The vapor barrier minimizes moisture infiltration. Without a vapor barrier, your Module will have difficulty maintaining the humidity in the room.

Do not introduce unconditioned outside air into the space.



Note that 36 in (914 mm) of clear floor space in front of the Module is required for service access.

### **Electrical inspection**

The electrical inspection verifies that all electrical connections are secure and correct and that the Module is properly grounded.



To perform the inspection, see "Electrical Inspection Checklist" on page 53.



All electrical wiring must comply with NEC and local codes.

The Module must be grounded to an earth ground (do not use a water-pipe ground).

Three-phase electrical service is required.

### Mechanical/chilled water

The chilled water mechanical inspection ensures that field piping is properly installed, including proper piping sizes. The system is checked for leaks, air in the system, and proper installation.



See "Mechanical Inspection: Checklist" on page 55.



Do not block air distribution (blower vents) with field-installed piping.

### User interface box inspection

The user interface box inspection verifies that the sensors and internal communications links of the Module are installed properly. Check that the outdoor heat exchanger is connected to the Module and that it is linked to the other Modules in the room (if you are using system and group controls).



To perform the inspection, see "User Interface Box Inspection Checklist" on page 57.

### **Functional test**



The inside of the Module must be free from debris before it is started.



Ensure that air filters are clean and in place.

- 1. Apply power to the Module.
- With the outer doors open and the center door removed to gain access to the electrical box components, check the voltage at the main power connection point. The voltage reading must match electrical rating on nameplate +/- 10%. Record the line voltage on the site form.
- 3. Turn the main power circuit breaker to **On**.
- 4. Check the voltage of the controller power supply transformer; it has a voltage range of 25–30 VAC.
- 5. Check the voltage in the secondary control circuit of the other two transformers; they have a nominal voltage of 24 V. The voltages must be between 22.0 and 26.5 VAC.
- Start the Module using the display interface (Main Menu > On/Off). After three seconds, use the same command to stop the Module. Verify that the blowers are rotating in the proper direction.
- 7. Verify that the blower motor current is within the range specified on the nameplate.

### **Calibrate airflow**

## Path: Main Menu > Setup > Module > [Main or Expansion] Module > Module Control > Adjust Blower

**Airflow.** Verify that the airflow is within acceptable limits. The differential pressure across the coil is displayed at the bottom of the screen. Adjust the blower frequency until the coil differential pressure meets the values listed in the table below.

Coll Differential Pressure Values							
	8000	7750	7500	7250	7000	6750	6450
FM-3 Row	0.28	0.27	0.25	0.24	0.23	0.21	0.2
FM-4 Row	0.37	0.35	0.33	0.32	0.3	0.28	0.26

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### Anti-freeze protection

For freeze protection in glycol systems, refer to the glycol manufacturer's specifications to determine percent of glycol needed based on lowest expected ambient temperatures.

### Start-up inspection

The start-up inspection ensures that the Module is operating properly after its initial start-up. This inspection verifies that all modes of operation are working correctly and that the Module is ready for normal operation.

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To perform the inspection, see "Final Inspection Checklist" on page 59.

### **Final inspection**

The final inspection ensures that the system is ready to begin service. This inspection verifies that the system is clean, the installed options work properly, the setpoints and deadbands are set, and the startup form is sent to APC.

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To perform this inspection, see "Final Inspection Checklist" on page 59.

## **Initial Inspection Checklist**

### Ensure that the:

Installation procedure is complete according to the installation manual.
Walls, floor, and ceiling are sealed with vapor barrier.
Raised floor space (downflow Modules only) beneath the Module is a minimum of 12 inches for Modules with capacities up to 50 KW (14 tons) and 18 inches for Modules with capacities over 50 KW (14 tons).
Floor stands (downflow Modules only) are installed correctly and that the Modules are secured to them.
Sub-bases (upflow Modules only) are installed correctly and that the Modules are secured to them.
Duct work/plenums are properly installed.
Module shows no signs of damage.
Clearance around the system is in accordance with ASHRAE, local and national code as well as the installation manual.
Shipped components (disconnect handles, leak detection devices, condensate pumps, thermostats, display, etc.) are installed securely in the Module.



Equipment must be properly de-energized and locked-out prior to performing any service on this equipment.

Never operate this Module with any cover, guard, door, or panel removed unless instructions indicate otherwise, and do so with extreme caution.



Do not run service utilities in front of the blower outlets.



The vapor barrier minimizes moisture infiltration. Without a vapor barrier, your Module will have difficulty maintaining the humidity in the room.

Do not introduce unconditioned outside air into the space.

Incoming voltages match the phase and voltage listing on the nameplate.
Module is properly grounded to an earth ground.
Internal electrical components and terminal blocks do not have any loose connections.
Electrical connections are tight, including: contactors, terminal blocks, circuit breakers, controllers, switches, relays, auxiliary devices, and field connections.
Circuit breakers are correct and securely attached to the DIN rail.
Interconnecting control wiring from the Module to the outdoor heat exchanger/pump is correct.



All electrical wiring must comply with NEC and local codes.

The Module must be grounded to an earth ground (do not use a water-pipe ground).

Three-phase electrical service is required.

Condensate drain line is at least the size of the drain connection.
Condensate drain line is pitched (1/8 inch per foot minimum) and properly trapped (4–5 inches).
Humidifier (if the Module is equipped with a humidifier) water-supply piping is connected and is the correct size.
Mechanical connections are tight. Check that the humidifier cylinders are seated on the fill/drain block.
Piping does not have any leaks.
External chilled water isolation valves are open.
Air is bled from the system. If air remains in the system, bleed it out now.
Supply water temperature is recorded.



Do not block air distribution (blower vents) with field-installed piping.

Failure to properly install piping may result in improper Module operation.

System CAN bus is connected to each System, Main Module, and Expansion Module.
OHE (outdoor heat exchanger) interlock is connected.
Input contacts and output relays are connected correctly.
Module CAN bus is connected to each PCIOM board.
Building management system RS-485 port is connected properly (if connecting to a building management system).

Interior and exterior of the system are clean and free from debris.
Installed options (smoke detectors, firestat, water detector, remote sensor, remote relay shutdown, dry contact alarm, essential/nonessential lock-out, redundant Group control, condensate pump, etc.) are operating correctly.
Set the setpoints and deadbands.
Packaging materials are disposed of properly.
Send the start-up form to APC.

### While the Module is operating, check the following:

Sight glass moisture sensor is green.
<ul> <li>Current draw of all blowers, heaters, humidifiers, transformers, and fans for each mode of operation (cool, reheat, dehumidify, humidify) are within their circuit breakers ratings.</li> <li>1. Record the current at the main power connection of the main circuit breaker.</li> <li>2. Record all current draws on the load side of any circuit breakers used for each device.</li> <li>3. Compare the circuit breaker setting for each device to the actual current measured and the full load amps of the device to verify that the current draws are acceptable.</li> </ul>
Module is free from malfunctions, including leaks, unusual vibrations, or other irregularities in each mode of operation.
Cool, reheat, dehumidification, and humidification cycles engage.
Coil fluid valve actuator operates correctly.
<ul> <li>Coil fluid temperature is within the acceptable range.</li> <li>1. Lower the cool setpoint to engage cooling.</li> <li>2. Raise the coil fluid temperature actuator threshold until the Coil begins cooling.</li> <li>3. Confirm that the coil fluid temperature activation threshold is within the building chilled water supply temperature. Adjust the coil fluid temperature activation threshold to operate within those ranges.</li> </ul>
Filters are clean and free of debris.
<ul> <li>Clogged filter alarm is operating properly.</li> <li>1. Cover 1/3 of the filter area.</li> <li>1. Increase/decrease the clogged filter switch sensitivity so that the switch closes.</li> <li>Note: Only for use with new, clean filters.</li> </ul>
Every installed option is operating properly.
Condenser/dry cooler setpoints, ambient statistics, discharge leaving statistics, and fan speed control setpoints are all recorded.
Stand-by pump (for dual-pump systems) is operating properly.

## Warranty

### Warranty Statement

The limited warranty provided by American Power Conversion Corporation ("APC") in this Statement of Limited Factory Warranty applies only to Products you purchase for your commercial or industrial use in the ordinary course of your business.

### LIMITED FACTORY WARRANTY

### APC product covered

NetworkAIR FM Precision Air Conditioning Unit

### Terms of warranty

APC warrants that the Product shall be free from defects in materials and workmanship for a period of one (1) year from the date of start-up when APC authorized service personnel performed the start-up of the Product, or a maximum of 18 months from the date of Product shipment from APC, when APC authorized service personnel have not performed the start-up of the Product ("Warranty Period"). In the event that the Product fails to meet the foregoing warranty, APC shall repair or replace any defective parts, such repair or replacement to be without charge for on-site labor and travel if APC authorized personnel have conducted start-up of the Product. An APC Start-Up Service must be performed/completed by APC authorized service personnel or replacement of defective parts only will be covered. APC shall have no liability and no obligation to repair the installed Product if non-authorized personnel performed the start-up and such start-up caused the Product to be defective. Any parts furnished under this warranty may be new or factory-remanufactured. **This warranty does not cover** circuit breaker resetting, loss of refrigerant, consumables, or preventative maintenance items. **Repair or replacement of a defective product or part thereof does not extend the original warranty period.** 

### Non-transferable Warranty extends to first purchaser for use

This Warranty is extended to the first person, firm, association or corporation (herein referred to by "You" or "Your") for whom the APC Product specified herein has been purchased. This Warranty is not transferable or assignable without the prior written permission of APC.

### Assignment of warranties

APC will assign to you any warranties which are made by manufacturers and suppliers of components of the APC Product and which are assignable. Any such warranties are assigned "AS IS" and APC makes **no representations** as to the effectiveness or extent of such warranties, assumes NO RESPONSIBILITY for any matters which may be warranted by such manufacturers or suppliers and extends no coverage under this Warranty to such components.

### Drawings, descriptions

APC warrants for the Warranty Period and on the terms of the Warranty set forth herein that the APC Product will substantially conform to the descriptions contained in the APC Official Published Specifications or any of the drawings certified and agreed to by an authorized APC representative, if applicable thereto ("Specifications"). It is understood that the Specifications are **not warranties of performance** and **not warranties of fitness for a particular purpose**.

### Warranty claims procedure

To obtain service under Warranty, contact APC Customer Support at (800) 800-4272. You will need the model number of the Product, the serial number, and the date purchased. A technician will ask you to describe the problem. If it is determined that the Product will need to be returned to APC you must obtain a returned material authorization (RMA) number from APC Customer Support. Products that must be returned must have the RMA number marked on the outside of the package, and be returned with transportation charges prepaid. If it is determined by APC Customer Support that on-site repair of the Product is allowed, APC will arrange to have APC authorized service personnel dispatched to the Product location to repair or replace the Product at the discretion of APC.

### **Exclusions**

APC shall not be liable under the Warranty if its testing and examination discloses that the alleged defect in the product does not exist or was caused by your or any third person's misuse, negligence, improper installation or testing, unauthorized attempts to repair or modify, or any other cause beyond the range of the intended use, or by accident, fire, lightning or other hazard.

THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, BY OPERATION OF LAW OR OTHERWISE, OF PRODUCTS SOLD, SERVICED OR FURNISHED UNDER THIS AGREEMENT OR IN CONNECTION HEREWITH. APC DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY, SATISFACTION AND FITNESS FOR A PARTICULAR PURPOSE. THE APC EXPRESS WARRANTIES WILL NOT BE ENLARGED, DIMINISHED, OR AFFECTED BY AND NO OBLIGATION OR LIABILITY WILL ARISE OUT OF APC RENDERING TECHNICAL OR OTHER ADVICE OR SERVICE IN CONNECTION WITH THE PRODUCTS. THE FOREGOING WARRANTIES AND REMEDIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND REMEDIES. THE WARRANTIES SET FORTH ABOVE, CONSTITUTE SOLE LIABILITY OF APC AND YOUR EXCLUSIVE REMEDY FOR ANY BREACH OF SUCH WARRANTIES. THE WARRANTIES EXTEND ONLY TO YOU AND ARE NOT EXTENDED TO ANY THIRD PARTIES.

IN NO EVENT SHALL APC, ITS OFFICERS, DIRECTORS, AFFILIATES OR EMPLOYEES BE LIABLE FOR ANY FORM OF INDIRECT, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES ARISING OUT OF THE USE, SERVICE OR INSTALLATION OF THE PRODUCTS, WHETHER SUCH DAMAGES ARISE IN CONTRACT OR TORT, IRRESPECTIVE OF FAULT, NEGLIGENCE OR STRICT LIABILITY OR WHETHER APC HAS BEEN ADVISED IN ADVANCE OF THE POSSIBILITY OF SUCH DAMAGE.

### Warranty Procedures

### Claims

You will need the model number of the Product, the serial number, and the date purchased. A technician will also ask you to describe the problem. If it is determined that the Product will need to be returned to APC you must obtain a returned material authorization (RMA) number from APC Customer Support. Products that must be returned, must have the RMA number marked on the outside of the package, and be returned with transportation charges prepaid. If it is determined by APC Customer Support that on-site repair of the Product is allowed, APC will arrange to have APC authorized service personnel dispatched to the Product location for repair or replacement, at the discretion of APC.

### Labor

- APC will support labor costs if a quality issue is found during start-up that is determined to be caused by workmanship or a factory defect.
- The mechanical contractor that is performing the repairs must call APC technical service to obtain a repair authorization number before any work is started.
- The mechanical contractor must provide detailed information, (photos, start-up sheets) to APC technical service before any repairs are started.
- If any repairs are performed without prior authorization, APC will not pay for any labor cost.
- APC will not support claims for any of the following:
  - Truck rental
  - Travel time
  - Rental on recovery machine and cylinders
  - Gas mileage
  - Solder, flux, silver solder, and silver solder flux.
- APC will pay for \$2.50 per pound for refrigerant.

To obtain a repair authorization number for a NetworkAIR product, call APC NetworkAIR technical services between 8:00 A.M. and 5:00 P.M. Eastern time, Monday through Friday:

- Phone: (1)(888)695-6500 (USA and Canada, toll free)
- Fax: (1)(401)788-2691
## Parts

- APC warrants the parts of their systems for 1 year or 18 months from the ship date. This warranty only covers the cost of the part and not the labor for installation.
- Calls for warranty parts requests need to have specific unit information (serial number, model number, job number) to allow proper identification and processing of the warranty part transaction.
- A purchase order may be required to issue any warranty parts. An invoice will be sent once the part(s) are shipped to the field. You have 30 days to return the part to APC. After 30 days, the warranty invoice will be outstanding, and payment of the invoice will be expected in full.
- Return authorization documentation will be sent with the replacement part. This documentation must be sent back with the defective part to APC for proper identification of the warranty return. Mark the warranty return number on the outside of the package.
- After the part has been received at APC, we will determine the status of the credit based on the findings of the returned part. Parts that are damaged from: lack of maintenance, misapplication, improper installation, shipping damage, and acts of man/nature will not be covered under the parts warranty.
- Any warranty parts request received before 1:00 PM EST will be shipped same day standard ground delivery. Any costs associated with Next Day or Airfreight will be the responsibility of the party requesting the part.
- Return freight of warranty parts to APC is the responsibility of the party returning the part.



## **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 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 searching APC Knowledge Base and using e-support.

- Contact an APC Customer Support center by telephone or e-mail.
  - Regional centers:

Direct InfraStruXure Customer Support Line	(1)(877)537-0607 (toll free)
APC headquarters U.S., Canada	(1)(800)800-4272 (toll free)
Latin America	(1)(401)789-5735 (USA)
Europe, Middle East, Africa	(353)(91)702000 (Ireland)
Japan	(0) 35434-2021
Australia, New Zealand, South Pacific area	(61) (2) 9955 9366 (Australia)

- 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.

To obtain a repair authorization number for a NetworkAIR product, call APC NetworkAIR technical services between 8:00 A.M. and 5:00 P.M. Eastern time, Monday through Friday:

- Phone: (1)(888)695-6500 (USA and Canada only, toll free)
- Fax: (1)(401)788-2691

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