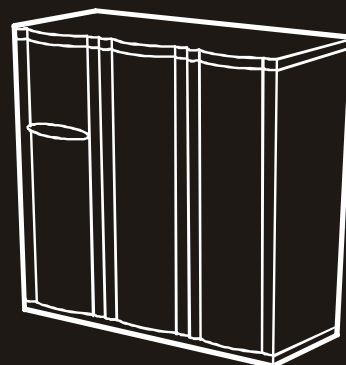




NetworkAIR[®] FM Precision Air Conditioner

Operation, Maintenance, and
Troubleshooting



Contents

Operation	1
Display Interface	1
Using the Display Interface	2
Scrolling status screens	2
Main menu screen	3
Navigating the interface	3
Password entry	4
Start the system	4
Change settings	4
Stop the system	5
Factory default settings	5
Set Up System Configuration	6
System options	6
System delays	8
Building management	9
Sensor setup	9
Options for Fluid-Cooled Modules	11
Valve types	12
Actuator types	13
Economizer isolation valve (optional)	13
Coil fluid temp activation threshold and deadband	14
Set Up Contacts and Relays	16
Input contacts	16
Output relays	17
Set Up Module Configuration	19
Configure Module	19
Alarm detectors	19

Set Up Module Control.	20
Calibrate airflow manually	20
Calibrate airflow automatically	20
Reset variable frequency drive	21
Reset humidifier	21
Set up humidifier	21
Control the Environment	22
How the modes work	22
Setpoints	24
Deadbands	24
Modes	27
Essential functions	27
PID controls	28
How to tune the PIDs	29
Humidification sensitivity	30
Set Up Alarms	31
Temperature alarms	31
Humidity alarms	31
Maint intervals	32
Alarm delay	32
Coil fluid thresholds	32
Set Up Group.	33
Group config	33
Group settings	34
Sys failure events	35
Set Up the Display	36
Password & time-out	36
Date and time	36
Temperature & pressure units	37
Adjust display	37
How to update the firmware	37
Reset to defaults	38
Product data	38
Set Up Network Configuration	39
Network config	39

View Status Readings	40
Scrolling status screens	40
Module status	40
System status	41
Group status	42
View Event Log	43
View log	43
Respond to Alarms	44
Major or minor alarm LEDs	44
Control beeper	44
View active alarms	44
Clear active alarms	45
Reset sys failure	45
Alarm messages and suggested actions	46
 Network Management Card	 55
Quick Configuration	55
Overview	55
TCP/IP configuration methods	56
APC Device IP Configuration Wizard	56
BOOTP & DHCP configuration	56
Local access to the control console	59
Remote access to the control console	59
Control console	60
How to Access a Configured Unit	61
Overview	61
Web interface	61
Telnet/SSH	61
SNMP	62
FTP/SCP	63
How to Recover From a Lost Password	64
How to Upgrade Firmware	66

Maintenance 69

Monthly Preventive Maintenance 69

Environment 69

Cleanliness 70

Mechanical 70

Electrical 70

Quarterly Preventive Maintenance 71

Mechanical 71

Electrical 71

Functional tests 72

Semi-Annual Preventive Maintenance 73

Cleanliness 73

Mechanical 73

Electrical 73

Functional tests 74

Troubleshooting 75

Refrigeration 75

Electrical 80

Warranty 81

Warranty Statement 81

APC product covered 81

Terms of warranty 81

Non-transferable Warranty extends to first purchaser for use . 81

Assignment of warranties 81

Drawings, descriptions 82

Exclusions 82

Warranty Procedures 83

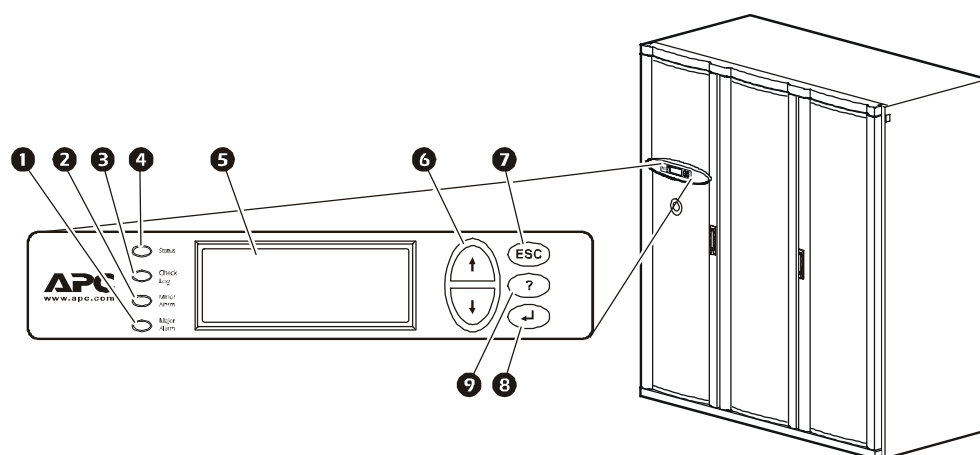
Claims 83

Labor 83

Parts 84

Operation

Display Interface



Item	Function
➊ Major Alarm LED	When red, a major alarm condition exists.
➋ Minor Alarm LED	When yellow, a minor alarm condition exists.
➌ Check Log LED	When yellow, at least one new major alarm or minor alarm or event has occurred.
➍ Status LED	When green, the Module is on.
➎ Liquid Crystal Display (LCD)	View alarms, status data, instructional help, and configuration items.
➏ Up and down arrow keys	Select menu items and access information.
➐ ESC key	Return to previous screen.
➑ ENTER key	Open menu items and input changes to System and Module settings.
➒ 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.



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.

Instrukcja Obsługi w języku polskim jest dostępna na CD.

Инструкция по использованию на русском языке прилагается на диске (CD).

Main menu screen

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

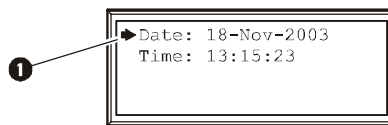


Note

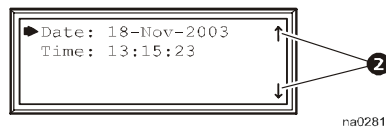
If the display interface is inactive for ten minutes (the default delay), it will return to the scrolling status screens. To change this delay, use the **time-out** setting under the **Password** menu.

Navigating the interface

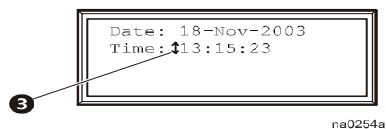
Selector arrows. Press the up or down arrow key to move the selector arrow ❶ to a menu option or setting. Press the ENTER key to view the selected screen or modify the setting.



Continue arrows. Continue arrows ❷ 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 ❸ 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.

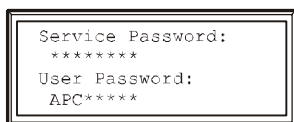


Password entry

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.



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.

Note

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**.



Note

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).

Set Up System Configuration

The System configuration options are defined both at the factory and during the commissioning of the Modules in the System.



Changing the settings incorrectly can cause serious malfunctions and damage to your System. Only qualified service personnel should make changes to these settings.



The System configuration settings do not all apply to the APC NetworkAIR FM Precision Air Conditioner.

System options

Path: Main > Setup > System # > System Config > System Options

The **System Options** menu contains settings that identify the hardware installed in this System and the methods used to control that hardware.

Mains In. Indicate the primary operating voltage required for this System. The configuration is based on the voltage of the electrical components in the System, and is printed on the nameplate attached to the door on the left side of the electrical box.

UPS In. Indicate the operating voltage rating for the back-up power supply. The configuration is based on the voltage of the electrical components in the System, and is printed on the nameplate attached the door on the left side of the electrical box.

Coil Cfg. Indicate the coil configuration installed in the Modules of this System. Coil configurations include:

- Chilled liquid only — Chilled water coil only
- DX — Direct expansion (DX) coil
- Econ — Economizer and DX coils
- MultiCool — MultiCool (chilled water) and DX coils

Humid Ctrl. Indicate the humidity control method. The System can control the humidity based on the following:

- Relative humidity (**RH**) of the return air.
- Dew point (**DewPt**) of the return air. The dew point method corrects for hotspots near the environmental sensors.



The System will always use the dew point method, regardless of this setting when:

- The System uses the remote sensor readings to control the room environment
- The System is part of a redundant Group.

PCIOMs. Set the number of Programmable Customer Input/Output Modules (PCIOMs) installed in the user interface box. This setting controls the number of input contacts and output relays available in the **Input/Output** menu.



See “Set Up Contacts and Relays” on page 16 to set up the contacts and relays from the display interface.



See also

See the *Installation Manual* to connect the contacts and relays to the Main Module.

Modules in Sys. Indicate the number of Modules in this System. Up to three Modules can be joined together to work as a single System.

Air Filter. Set the type of air filters installed in the Modules of this System to either standard or high efficiency.

Fast Startup. Set the System to bypass the normal start-up sequence and delay the next time power is applied to the System.



Note

Fast Startup is not recommended for typical installations.

Airflow. Set the airflow pattern for the Modules in this System:

- Up
- Down
- Horizontal

Rej. Method. Indicate the fluid used for heat of rejection by the refrigeration system:

- Air
- Water
- Glycol



Note

The rejection method setting applies only to configurations using compressors. In configurations using only chilled water the rejection method does not apply.

Dehum Capacity. The **Dehum Capacity** setting does not apply to Systems without compressors. For Systems with compressors (direct expansion), the dehumidify mode can be set to use half capacity or full capacity of the cooling coil.

- Half capacity—uses one compressor and half of the cooling coil to dehumidify. Rooms with small heat loads should use half capacity to avoid over-cooling while dehumidifying.
- Full capacity—uses the entire coil and both compressors.

Module Rot. The **Module Rot.** setting does not apply to Systems without compressors. For Systems with compressors (direct expansion), the System rotates the order in which the compressors are engaged to equalize the total number of hours that each compressor runs. Set the number of hours at which to change the order in which the compressors are engaged. A setting of zero indicates that the order in which the compressors are engaged should not be changed.

Refrigerant. The **Refrigerant** setting applies only to Systems with compressors. Set the type of refrigerant charge used in the direct expansion refrigeration system.

Suction Pressure Compensation. The **Suction Pressure Compensation** setting does not apply to Systems without compressors. For Systems with compressors (direct expansion), **Suction Pressure Compensation** allows the System to slow the blowers if the suction pressure gets too high. Use this setting if you are using the FM in a high density application.

System delays

Path: Main > Setup > System # > System Config > System Delays

The System Delays protect the Modules in the System from excessive wear and damage, and keep the modes from working against each other.

Comp Min ON. The **Comp Min ON** setting does not apply to Systems without compressors. For Systems with compressors (direct expansion), the delay begins when the compressor engages, and then prevents the compressor from disengaging until the delay has expired. It protects the compressors from rapidly cycling between on and off and pushing all of their lubricating oil out into the refrigerant line.



Caution

Reducing the **Comp Min ON** delay can shorten the lives of your compressors by causing excessive wear and damage.

Comp Min OFF. **Comp Min OFF** setting does not apply to Systems without compressors. For Systems with compressors (direct expansion), the delay begins when the compressor disengages, and then prevents the compressor from engaging until the delay has expired. It protects the compressors from rapidly cycling between on and off and pushing all of their lubricating oil out into the refrigerant line.



Caution

Reducing the **Comp Min OFF** delay can shorten the lives of your compressors by causing excessive wear and damage.

Cndsr Vlv Dly. The **Cndsr Vlv Dly** setting does not apply to Systems without compressors. For Systems with compressors (direct expansion), the "condenser fluid valve close delay" begins when the compressors disengage, and then keeps coolant flowing through the heat exchanger until the delay expires. Once the delay expires, the condenser fluid valve closes.

Intrstg Dly. The **Intrstg Dly** setting does not apply to Systems without compressors. For Systems with compressors (direct expansion), the interstage delay begins when the first compressor (stage 1) in a Module engages. It prevents a second compressor (stage 2) in a System from engaging until the delay has expired.

Start-up Dly. The **Start-up Dly** applies to all System configurations. The delay begins when the System is started and initialized. The System cannot begin operation until this delay has expired. Use the start-up delay to restart equipment sequentially in your room after a power loss.

Mode Dly. The **Mode Dly** setting applies to all System configurations. The delay begins when the blowers start. It allows the sensors to obtain an accurate reading of the room conditions, and the System to check for major alarms before engaging environmental control functions.

Communication Loss Shutdown Delay. Set the communication loss shutdown delay. The delay begins when an Expansion Module loses communication with the Main Module of a System. If communication is not restored before the delay expires, the Expansion Module will shut down. Set the delay for up to twenty-four hours, or set the Expansion Modules to remain operating if communication with the Main Module is lost by selecting **Disabled**.

Building management

Path: Main > Setup > System # > System Config > Building Management

If you are using a building management system with your NetworkAIR FM Precision Air Conditioning Unit you must set the following values:

Address. The address of the Main Module on the RS-485 bus for a building management system.

Baud Rate. The bus speed for the RS-485 bus.

Parity. The parity for the RS-485 bus.

Stop Bits. The stop bits for the RS-485 bus.



See also

See the *Installation Manual* to wire the electrical connections to the RS-485 bus for connecting to a building management system.

Sensor setup

Path: Main > Setup > System # > System Config > Sensor Setup

Specify the set of sensors the NetworkAIR FM Precision Air Conditioning Unit will use to calculate the environmental control demands. These settings apply only to NetworkAIR IR Systems.

Temp/Hum Snsrs: Choose the set of temperature and humidity sensors the controller will use when determining the need for environmental control. The return sensors and the remote sensor string are available.

Dflt Snsrs: Choose the sensor group that the System will use when the System settings are reset to their default values.

Rmt Snsr Data: When determining the environmental controls, choose the measurement from the remote sensors for the controller to use.

- **Max** — Use the value reported by the remote temperature and humidity probe reporting the maximum value on the remote sensor string.
- **Avg** — Use the average of all of the remote temperature and humidity probe values.

Options for Fluid-Cooled Modules

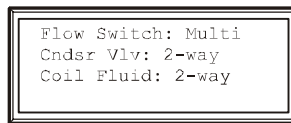
Water- and glycol-cooled Modules have settings for the valves and piping needed to accommodate the heat of rejection method. In addition, Modules using the Economizer, MultiCool, or chilled water options provide cooling by using a fluid coil without a compressor, rather than the direct expansion coils, and have several settings which must be defined.

The following table lists the settings that apply to each type of fluid-cooled Module. Refer to the rest of this section for detailed descriptions of each setting:

Fluid-Coil Type	Applicable Settings
Chilled Water (NetworkAIR IR only)	<ul style="list-style-type: none">• Coil Cfg (System Configuration)• Coil Fluid Valve• Coil Fluid Valve Actuator
MultiCool	<ul style="list-style-type: none">• Rej Method• Coil Cfg (System Configuration)• Coil Fluid Valve• Coil Fluid Valve Actuator• Cndsr Vlv (Water and Glycol only)• Cndsr Vlv Actuator (Water and Glycol only)• Coil Fluid Temp Activation<ul style="list-style-type: none">– Threshold– Deadband
Economizer	<ul style="list-style-type: none">• Rej Method (System Configuration)• Coil Cfg (System Configuration)• Cndsr Vlv• Cndsr Vlv Actuator (always floating control)• Coil Fluid Valve (always 3-way)• Coil Fluid Valve Actuator• Coil Fluid Temp Activation<ul style="list-style-type: none">– Threshold– Deadband• Econ Isolator Valve (optional)• Econ Isolator Valve Delay: Open (optional)• Econ Isolator Valve Delay: Closed (optional)• Set an output relay to Econ Isolator (optional)

Valve types

Path: Main > Setup > System > System Config > Valve Types



Set the type of valves installed in your piping system. Each valve can be either 2-way or 3-way. Economizer-equipped Systems use 3-way valves.

Flow Switch. Set the location of the optional flow switch in this System. The flow switch detects whether there is adequate liquid coolant (glycol or water) flow to maintain coil operation.

If the flow switch detects inadequate flow in a MultiCool or Economizer coil, it will switch the cool or dehumidify mode to the direct expansion coil. If the flow switch detects inadequate coolant flow at the heat exchanger for a direct expansion coil, it will disable the compressors.

The **Flow Switch** setting indicates where the flow switch is installed:

- **DX**, for the water or glycol line entering the heat exchanger (to maintain head pressure in DX Systems)
- **Multi**, for the chilled water input to the MultiCool coil or chilled water coil (Systems using chilled water only)
- **None**, for air-cooled Modules with no MultiCool coil

Cndsr Vlv. The condenser fluid valve controls the flow of coolant into the heat exchanger or the Economizer coil. Set the condenser fluid valve as either a 2- or 3-way valve depending on the configuration.

Coil Fluid. The coil fluid valve controls the flow of coolant to either the MultiCool, Chilled Water, or Economizer coil. Set the coil fluid valve as either a 2- or 3-way valve depending on the configuration.

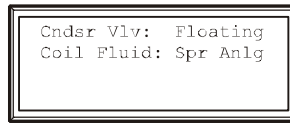


Note

Economizer valves are always 3-way.

Actuator types

Path: Main > Setup > System > System Config > Actuator Types



Cndsr Vlv. Set the type of condenser valve actuator, the actuator can be set as **Flt Ctrl** or **None**.

- **Floating Control** maintains the position of the valve when the power is off.
- **None** indicates that no condenser valve is installed. Air-cooled Systems with no external water piping do not require a condenser valve actuator.

Coil Fluid. Set the Coil Fluid valve actuator to **Spr Anlg**, **Flt Ctrl**, or **None**.

- **Floating Control** maintains the position of the valve when the power is off.
- **Spring (Return) Analog** closes the valve when the power is off.
- **None** indicates that the Module does not have a MultiCool, Chilled Water, or Economizer coil.

Economizer isolation valve (optional)

The Economizer automatic coolant-isolation valve is a feature of Economizer Modules. Modules with an Economizer coil use 3-way valves, meaning that coolant flows through the Economizer coil at all times. If you want to shut off the flow through the Economizer coil during periods of no demand, install an Economizer automatic coolant-isolation valve in the Economizer piping, and connect the shut-off valve actuator to a PCIOM output relay. The controller can then anticipate a cooling demand and activate the relay, which opens the external shut-off valve, allowing coolant to flow through the Economizer coil. When there is no longer a need for cooling, the controller closes the isolation valve.

To use the Economizer isolation valve, the valve must be installed in the Economizer piping, and four settings need to be defined:

- **Econ Isolator Close Dly**
- **Econ Isolator Open Dly**
- **Econ Isolator Vlv: Enable**
- **Econ Isolator** mapped to an output relay

Path: Main > Setup > System # > System Config > System Delays

Econ Isolator Valve Delay: Close. When there is no longer a demand for cooling, the Economizer isolation valve actuator closes the valve. The valve remains open during the close delay, keeping coolant flowing through the coil and the heat exchanger until the delay expires.

Econ Isolator Valve Delay: Open. When there is a demand for cooling, the Economizer isolation valve actuator opens the valve. The compressors will not engage until the open delay has expired.



Note

If you are using different types of actuators for the Modules in your System, set the open delay to accommodate the valve that takes the longest to open.

Path: Main > Setup > System # > System Config > Coil Fluid Options

Econ Isolator Valve: Enable. Use this setting to indicate that an Economizer isolation valve is installed in the coolant piping for this System.

Path: Main > Setup > System # > Input/Output > Output Relays

Econ Isolator Output Relay. To use the Economizer isolation valve, you must map the **ECON ISOLATOR** event to one of the output relays. When you set up the relay for the Main Module, it will copy the settings to the Expansion Modules.



You must set an output relay to activate the Economizer isolation valve. See page 18 for instructions on how to set up the relay.

Coil fluid temp activation threshold and deadband

Path: Main > Setup > System # > System Config > Coil Fluid Options

Coil Fluid Temp Activation: Threshold: 50.2°F Deadband: 04.2°F ↓

The **Coil Fluid Options** help control the optional MultiCool coil or Economizer coil in equipped Systems. Set the temperature threshold and deadband for using the MultiCool coil or the Economizer coil. The System will compare the actual coolant temperature with the setpoint and deadband to determine if the coolant is at a temperature low enough to operate the coils.



Note

The Coil Fluid Temp Activation threshold and deadband do not apply to Modules that use only a chilled water coil for cooling, such as NetworkAIR IR.

Coil Fluid Temp Activation: Threshold. Set the coil fluid activation threshold. The coolant temperature must be below the threshold to use the optional MultiCool coil or Economizer coil.

Coil Fluid Temp Activation: Deadband. Set the MultiCool or Economizer activation deadband. The deadband is the sensitivity range above the **Coil Fluid Temp Activation: Threshold** that the coolant temperature can reach before the controller will stop using the MultiCool or Economizer coil. For example, if the threshold is 50°F (10°C) and the deadband is 4°F (2.2°C), then the controller will disengage the MultiCool coil or Economizer coil when the coolant temperature exceeds 54°F (12.2°C) and will not reengage the coil until the coolant temperature reaches 50°F (10°C).

Set Up Contacts and Relays

The System can monitor external contact closure events. Possible applications include:

- Magnetic contact switches
- Window foil
- Tamper switches
- Heat detectors
- Water sensors
- Pressure sensors
- Building smoke and fire detection systems

You can set input contacts to cause alarm conditions based on their current state and a user-defined normal state. Output contacts can map internal alarms and events to outside devices.



See also

See the *Installation Manual* for instructions on connecting contacts and relays to your Programmable Customer Input/Output Module (PCIOM).

Input contacts

Path: Main > Setup > System # > Input/Output > Input Contacts

Input:	01of16
Name:	Input1
Normal:	Open
Status:	Open

Delay:	030 s
Alarm Map:	Major Alarm

Each Main Module supports up to 16 user-defined input contacts. Each contact monitors a sensor and responds to changes in the state of the sensor (open or closed).

Name. Provide a unique name for each input contact.

Normal. Choose the normal state of the sensor. If the state changes, the controller takes the action defined by the **Alarm Map** setting.

Delay. Set how long the contact should be out of its normal state before the controller takes action (controlled by the **Alarm Map** setting).

Action. Set the System controller to respond to the change of status for an input in one of the following ways:

Map	Description/Function
Status Only	Displays the event on the Active Alarms screen. Status-only events are not logged.
Minor Alarm	Activates the Warning LED and the alarm beeper. It also creates an entry in the event log.
Major Alarm	Activates the Alarm LED and the alarm beeper. It also creates an entry in the event log.
Remote Run/Stop	Shuts down the Modules normally, waiting for delay timers.
Nonessential Lockout	Deactivates modes set as nonessential and continues operation.
Immediate Shutdown	Shuts down the Modules immediately. It does not wait for the blower delay or compressor timers.

Output relays

Path: Main > Setup > System # > Input/Output > Output Relays

Relay Out: 01of16
 Map: Main Module
 WATER DETECTED
 State: Enabled

Normal: Open
 Status: Open

The Main Module supports up to 16 user-defined output relays. Output relays respond to internal alarms and events by changing state to notify outside devices.

Relay Out. Choose the relay number to view or modify.

Map. Choose alarms or events to map to this relay:

- The first line of the map field displays the location of the event that is mapped to this relay. It can be a System, Main Module, Expansion Module 1, or Expansion Module 2 event.
- The second line displays the name of the event mapped to this relay.



Note

Any input contact and output relay available in this System can be mapped to this relay.



When using the Economizer automatic isolation valve, map only the **Econ Isolator** event to the relay connected to the valve actuator.



See the *Installation Manual* for instructions on wiring the relay connection to the automatic isolation valve actuator.

Action. The **Action** field changes as you scroll through the list of events that can be mapped to this relay. **Remove** indicates that the event is already associated with this relay. **Add** indicates that the event is not associated with this relay. Press the ENTER key and change the setting to map the displayed event to this relay or remove the displayed event from the list of events mapped to this relay.

Normal. Set the normal state for this relay. If the state of an alarm or event mapped to this relay changes from the normal state, the relay also changes state.

Reset Mappings. Clear all of the output mappings back to their default setting.

Set Up Module Configuration

The Module configuration settings help the controller determine which components are available and how the Module should operate.



Caution

The settings in the **Module Configuration** menu are defined at the factory. Changing the settings incorrectly can cause serious malfunctions and damage to your System. Only qualified service personnel should make changes to these settings.

Configure Module

Paths: Main > Setup > Module > Main Module > Module Config > Config Module
Main > Setup > Module > Expansion Module 1 > Module Config > Config Module

The **Config Module** menu contains settings that define the optional equipment available in the Module.

Output Cap. Indicate the output capacity of the Module, in kilowatts.

Heater. Indicate the type of heating equipment installed to run the reheat mode.

Humid. Indicate the type of humidifier equipment installed to run the humidification mode.

Conds Pump. Indicate the presence of a condensate pump. The pump feeds the condensate from the reservoir into the drain.

Blower. Indicate the type of blower controller for this Module.

ElecHeater Cap: indicate the capacity of the electric heater.

Alarm detectors

Paths: Main > Setup > Module > Main Module > Module Config > Set Alarm Detectors
Main > Setup > Module > Expansion Module 1 > Module Config > Set Alarm Detectors

The **Set Alarm Detectors** settings indicate the presence of sensors in the Modules:

- **Smoke** — Indicate whether a smoke detector is installed in the Module.
- **Fire** — Indicate whether a fire detector (thermal sensor) is installed in the Module.
- **Water** — Indicate whether water leak detectors (loop detectors) are installed in the Module.

Set Up Module Control

The Module Control options are configured and tuned during the commissioning of each Module.



Caution

The settings in the **Module Control** menu are defined at the factory. Changing the settings incorrectly can cause serious malfunctions and damage to your System. Only APC Field Service Representatives should make changes to these settings.

Calibrate airflow manually



Note

The System must be on and the blowers operating to calibrate the airflow manually. If either condition does not exist, the display will prompt you to turn on the System and blowers.

Nom Coil DP. Set the nominal coil differential pressure.

Blower Spd. Adjust the frequency of the blower.

Coil DP. Displays the coil differential pressure at the bottom of the screen. As the blower frequency is adjusted, the coil differential pressure will change. The Std Dry column in the table below gives the recommended coil differential pressure for the FM Precision Air Conditioner model.

Coil Differential Pressure Values

Model	Std Dry	Min	Max	Alarm Clear	Airflow Alarm
FM 40	0.23	0.19	0.28	0.15	0.09

All values are displayed in inches water column ("WC)

Calibrate airflow automatically

Nom Coil DP. Set the nominal coil differential pressure.

Start/Abort. Start the automatic calibration. If calibration is in progress, this line displays **Abort**.

Coil DP. Displays the coil differential pressure at the bottom of the screen. As the blower frequency is adjusted, the coil differential pressure will change. When the Coil DP values matches the Nom Coil DP value, the System will display **Calibration Complete**. If the System cannot align the two values, the System will display **Calibration Failed** after two minutes. You must manually calibrate the airflow if automatic calibration fails.

Reset variable frequency drive

Paths: Main > Setup > Module > Main Module > Module Control > Reset VFD #
Main > Setup > Module > Expansion Module > Module Control > Reset VFD #

The **Reset VFD** option resets the variable frequency drive (VFD). The drive shuts down during a **VFD # Fault Tolerance Exceeded** alarm. The alarm occurs when the VFD detects three faults within thirty minutes. Use this function to restart the drive manually when the alarm condition is resolved.



VFD Fault Tolerance Exceeded alarms indicate a problem with the VFD. Check the event log for other VFD alarms before resetting the VFD.

Reset humidifier

Paths: Main > Setup > Module > Main Module > Module Control > Reset Humidifier
Main > Setup > Module > Expansion Module > Module Control > Reset Humidifier

The **Reset Humidifier** option resets the humidifier. The humidifier shuts down during a **Humidifier Fault Tolerance Exceeded** alarm. The alarm occurs when the humidifier detects three faults within thirty minutes. Use this function to restart the humidifier manually when the alarm condition is resolved.



Humidifier Fault Tolerance Exceeded alarms indicate a problem with the humidifier. Check the event log for other humidifier alarms before resetting the humidifier.

Set up humidifier

Paths: Main > Setup > Module > Main Module > Module Control > Set up Humidifier
Main > Setup > Module > Expansion Module > Module Control > Set up Humidifier

The **Set up Humidifier** option controls the steam-electrode humidifier mode.

Humidifier Mode. The steam-electrode humidifier can be set to one of three modes:

- **Off** — Removes power from the electrodes in the humidifier, while the cylinder remains filled.
- **Drain** — Removes power from the electrodes and drains the cylinder.
- **Auto** — Applies power to the humidifier and sets the humidifier to operate according to the Module controller.



The steam-electrode humidifier must be in **Auto** mode to operate.

Control the Environment

The System controls the room environment by engaging one of four modes: Cool, Dehumidify, Reheat, and Humidify. These modes may work differently depending on the options and equipment installed in the Modules. For example, the cool mode may work differently if it is using a direct expansion (DX) coil, for which output is based on the setpoint and deadband settings, or a MultiCool™ coil, for which output is controlled by a Proportional plus Integral plus Derivative (PID) control loop.



Note

The environmental controls are set when your System is installed. Making changes to the settings described in this section after the system has been commissioned may result in improper operation.

How the modes work

DX Cool. When the cool mode uses the direct expansion coil, the output is determined by the difference between the setpoint and the average return air temperature of each of the Modules in the System (if more than one Module is present). The deadband is used to engage compressors incrementally with increasing demand. Each compressor in the System is assigned an equal division of the deadband (a number of degrees). As the average return temperature rises above the setpoint, a compressor is engaged as each division of the deadband (above the setpoint) is reached. If the average return temperature reaches the setpoint plus the deadband, all of the compressors will be engaged until the temperature drops below the setpoint plus the deadband.



See “Deadbands” on page 24 for instructions on setting the DX cool deadband.

Fluid Coil Cool. When the cool mode uses a Chilled Water, MultiCool or Economizer coil, the output is determined by the difference between the setpoint and the average return air temperature of each of the Modules in the System (if more than one Module is present). The proportional plus integral plus derivative (PID) control loop calculates the output as demand increases and opens the valve controlling the flow of coolant into the coil. As the average return temperature increases, the output will increase until it reaches 100 percent of capacity. For Modules with an Economizer coil, one stage (compressor) of DX cooling can be engaged per Module to help meet the demand.



See “PID controls” on page 28 for a description of the PID controls and instructions on tuning the fluid coil PID loop.

Reheat (Electric SCR and Modulating Hot Water). The SCR (silicon controlled rectifier) electric reheat and modulating hot water reheat functions are controlled by the reheat PID controller. When the return temperature of the Module drops below the reheat setpoint, the reheat output will increase as the return temperature drops until output reaches 100%.



See “PID controls” on page 28 for a description of the PID controls and instructions on tuning the fluid coil PID loop.

Reheat (Hot Gas, Steam, Hot Water On/Off). The output of the hot gas, steam, and hot water on/off reheat options is determined by the difference between the setpoint and return air temperature of the Module. When the return temperature at the Module reaches the setpoint minus the deadband, the reheat mode will activate until the return temperature rises to the setpoint.



See “Deadbands” on page 24 for acceptable reheat deadband values.

DX Dehumidify. Similar to DX cooling, the output for dehumidification is determined by the difference between the setpoint and the average return humidity from each of the Modules in the System (if more than one Module is present). The deadband is used to engage compressors incrementally with increasing demand. Each compressor in the System is assigned an equal division of the deadband (a percentage of relative humidity). As the average return humidity rises above the setpoint, a compressor is engaged as each equal division of the deadband (above the setpoint) is reached. If the average return humidity reaches the setpoint plus the deadband, all of the compressors will be engaged until the humidity drops below the setpoint plus the deadband. Unlike DX cooling, the compressors in each Module work as a single unit instead of separately. The use of one or two compressors per Module is based on the **Dehum. Capacity** setting (**Path: Main Menu > Setup > System # > System Config > System Options**).



See “Deadbands” on page 24 for instructions on setting the DX dehumidify deadband.

MultiCool Dehumidify. The MultiCool dehumidify mode is controlled by the dehumidify PID controller. When the return humidity rises above the setpoint, the dehumidify output increases as the return humidity rises until the output reaches 100%.



See “PID controls” on page 28 for a description of the PID controls and instructions on tuning the dehumidify PID loop.

Humidify. The steam cylinder humidifier output is controlled by the humidify proportional controller. When the return humidity drops below the humidify setpoint, the humidifier output will increase as the return humidity drops until the output reaches 100%.



See “Set Up Alarms” on page 31 for a description of the Humidification sensitivity band.

Setpoints

Path: Main > Control Environment > Setpoints

Cool:	72.4°F
Reheat:	68.5°F
Dehumid:	53.2%RH
Humidify:	48.4%RH

Setpoints are the target values each mode will maintain in the room. The default setpoints are appropriate for most precision cooling applications.

The setpoint for each mode must be within the following ranges:

- Cool: 61.8–90.0°F (16.5–32.2°C)
- Reheat: 60.0–88.2°F (15.6–31.2°C)
- Dehumidify: 30–80% Relative Humidity
- Humidify: 30–80% Relative Humidity



If a mode is disabled and you change the setpoint, the display will warn you that the mode is disabled. See “Modes” on page 27 to enable or disable operating modes.



You cannot overlap setpoints. If you overlap setpoints, the display warns you and resets the setpoints.

Note

The **Cool** setpoint must be 1.8°F (1°C) above the **Reheat** setpoint, if reheat is installed in the Module. The **Dehum** setpoint must be 1% RH above the **Humidify** setpoint if a humidifier is installed.

Deadbands

Path: Main > Control Environment > Deadbands

Cool:	08.2°C
Reheat:	06.4°C
Dehumid:	10.0%RH
Humidify:	08.2%RH

The deadband is the sensitivity range for a setpoint. It is the value above or below the setpoint at which the mode will output at full capacity. For the DX cool and DX dehumidification modes, the compressor stages are engaged one at a time as the temperature or humidity exceeds equal portions of the deadband (above the setpoint).

Acceptable deadband ranges include:

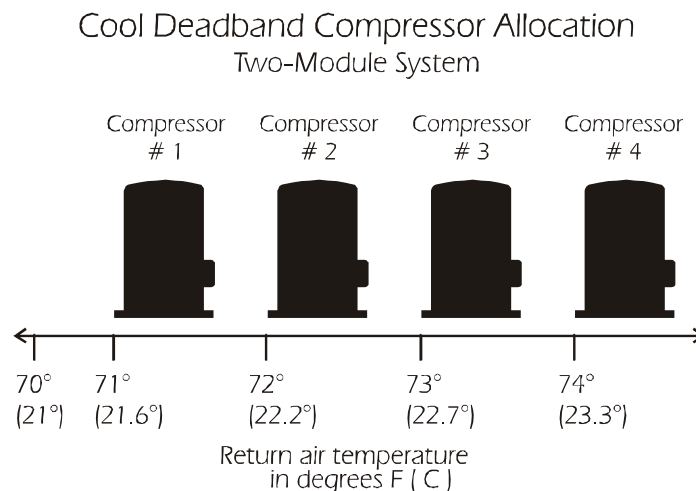
- Cool 0.5–10.0°F (0.28–5.6°C)
- Reheat 0.5–10.0°F (0.28–5.6°C)
- Dehumidify 1–10% Relative Humidity
- Humidify 1–10% Relative Humidity

Cool deadband. The Cool mode (using the DX coil) splits the deadband into equal segments according to the number of compressors in the System. A compressor is then assigned to each segment of the deadband above the setpoint. When the return temperature exceeds the temperature associated with that segment, the compressor engages and runs until the temperature drops below that segment.

To set the cool deadband for your System:

1. Determine the number of Modules in your System (1-3).
2. Multiply the number of Modules in your System by two.
3. Use this number as your cool deadband setting. This assigns each compressor a one degree Fahrenheit segment of the deadband above the setpoint.
4. Adjust the deadband setting higher or lower to increase or decrease the speed at which the system can respond to rising temperatures.

The graphic below is an example of a two-Module System (with four compressors). The setpoint is 70°F (21.1°C) and the deadband is 4°F (2.2°C). Each compressor engages as the return air temperature reaches its assigned segment of the deadband above the setpoint. When the return air temperature drops back below the temperature assigned to a compressor, that compressor disengages.



Too narrow (low-numbered setting) of a deadband will cause the System to engage compressors in response to a small temperature change. Since the compressors must run for a minimum period to avoid damage, this could over-cool the room.



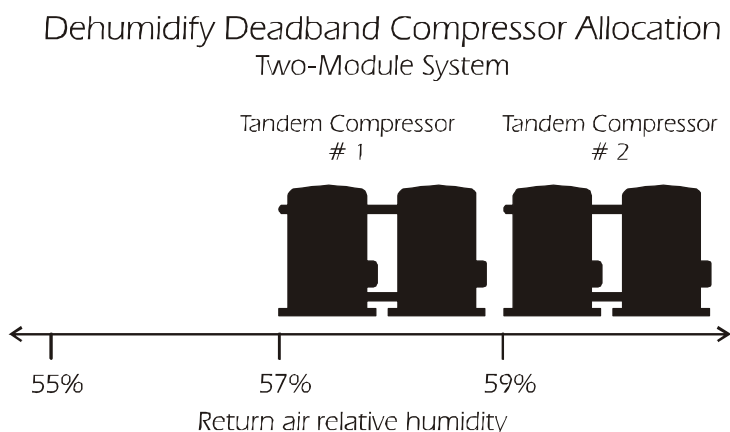
Too wide of a deadband (high-numbered setting) and the System will not engage all of its cooling capacity until the return air temperature is significantly above the setpoint.

Dehumidify deadband. The Dehumidify mode (using the DX coil) splits the deadband into equal segments according to the number of Modules in the System. A Module is then assigned to each segment of the deadband above the setpoint. When the return air relative humidity exceeds the relative humidity associated with that segment, the Module's compressors engage and run until the relative humidity drops below that segment.

To set the dehumidify deadband for your System:

1. Determine the number of Modules in your System (1-3).
2. Multiply the number of Modules in your System by two.
3. Use this number as your dehumidify deadband setting. This assigns each Module a two percent relative humidity segment of the deadband above the setpoint.
4. Adjust the deadband setting higher or lower to increase or decrease the speed at which the system can respond to rising relative humidity.

The graphic is an example of a two-Module System which is using full dehumidification capacity (tandem compressors working together as one). The setpoint is 55% Relative Humidity and the deadband is 4% Relative Humidity. Each Module's compressors engage as the return air relative humidity reaches their segment of the deadband above the setpoint. When the return air humidity drops back below the humidity assigned to a Module's compressors, those compressors disengage.



Caution

Too narrow (low-numbered setting) of a deadband will cause the System to engage compressors in response to a small humidity change. Since the compressors must run for a minimum period to avoid damage, this could overly dehumidify the room.



Caution

Too wide of a deadband (high-numbered setting) and the System will not engage all of its dehumidification capacity until the return air humidity is significantly above the setpoint.

Modes

Path: Main > Control Environment > Modes

Cool:	Enabled
Reheat:	Disabled
Dehumid:	Enabled
Humidify:	Enabled

Enable and disable the modes of operation. The four modes are:

- Cool
- Reheat
- Humidify
- Dehumidify

Modes can only be enabled or disabled using the service password.

Essential functions

Path: Main > Control Environment > Essential Functions

Cool:	Essential
Reheat:	Nonessent.
Dehumid:	Nonessent.
Humidify:	Nonessent.

Designate each mode as either essential or nonessential. The modes marked as nonessential are disabled when an alarm or event occurs that requires all nonessential operations to be stopped (Nonessential lockout).



See “Input contacts” on page 16 for a table with descriptions of how you can set up nonessential lockout events that occur when an input contact becomes active.

PID controls

Path: Main > Setup > System # > System Config > PID Controls

The Proportional plus Integral plus Derivative (PID) loop is used to control the output of the cool, reheat, and dehumidify modes.

01of03: Cool
Mode: Prop+Int+Der
P: 2 %/[°]
I: 5 %/[°]*min ↓

D: 2 %/[°]/min ↑

Choose which mode or actuator PID loop to tune, using the **01of03:** [Mode/Actuator name] setting.

Mode. Choose the multipliers to use in the PID algorithm. You can omit the derivative or the integral and derivative multipliers in the algorithm.

P. The proportional multiplier (gain) for this mode or actuator. The proportional multiplier adjusts for the difference (error) between the measurement (temperature or humidity) and the setpoint. The proportional multiplier is expressed in percent of output per unit error.

I. The integral multiplier (reset rate) for this mode or actuator. The integral multiplier adjusts for error measurement, and the amount of time that the error has existed. The integral multiplier adds to or subtracts from the output in small increments to correct for the offset error caused by the proportional contribution. It is expressed in percent of output for each minute and unit of error (error multiplied by minutes).

D. The derivative multiplier (derivative) for this mode or actuator. The derivative multiplier adjusts the output for rapid changes in the error, correcting for the rate of change of the error over time. It is expressed in percent of output for each unit of error per minute (error divided by minutes).

How to tune the PIDs

A qualified service technician must tune the PID loops to optimize the performance of each mode. The units shown are for temperature. In the dehumidify loop, the units are in percent relative humidity (% RH).



Caution

The PID loops must be tuned after the equipment in the room is installed and running. The loops should be tuned periodically to account for changes in the room load.

1. Select the PID loop to tune.
2. Adjust the integral and derivative constants to zero, and the proportional constant to twenty.
3. Set the temperature (cool or reheat) setpoint value and start the System.
4. When the temperature reaches a stable value, increase the proportional constant by 10. If the temperature does not respond to this change, adjust the setpoint.
5. Repeat step 4 until the temperature value starts to oscillate and the peak amplitude of the oscillations is constant.
6. Note the time, in minutes, between the peaks of the oscillations. This is the Ultimate Period, P_U .
7. Note the value of the proportional constant. This is the Ultimate Gain, G_U .
8. Compute the PID constants using the table below. Select the type of control from the rows of the table, and use the equations in the columns to compute the values for each constant.
9. Set each constant according to these calculations.

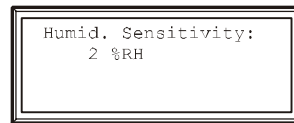
Control Method	Proportional	Integral	Derivative
P	$0.5 * G_U$	–	–
P + I	$0.45 * G_U$	$0.54 * G_U / P_U$	–
P + I + D	$0.6 * G_U$	$1.2 * G_U / P_U$	$0.075 * G_U * P_U$

You may need to further tune the PID loops in the following ways to account for changes in the room load:

Loop Behavior	PID Tuning Correction
Slow response to temperature/humidity changes	Decrease the proportional multiplier or increase the derivative multiplier.
Over-cooling/Under-cooling after changes in the room load or changes in setpoint	Increase the derivative or the proportional multipliers.
Environmental temperature/humidity never reaches the setpoint	Increase the integral setting.
Over-cooling/Under-cooling on constant room load	Decrease the integral multiplier.

Humidification sensitivity

Path: Main > Setup > System # > System Config > Humid. Sensitivity



Humid. Sensitivity. The humidifier sensitivity band is the percentage of relative humidity below the humidify setpoint at which the humidifier operates at full output.

Set Up Alarms

Set alarms to alert you to abnormal temperatures or humidity levels and the number of hours the components have been in operation.



Alarms will also alert you to malfunctions; however, malfunction alarms are not user-definable. See “Respond to Alarms” on page 44 for information on how to correct these conditions.



Note

Preset alarm threshold default values are applicable for most precision air conditioning applications.

Temperature alarms

Path: Main > Setup > System # > Alarms > Temp Thrshlds

Temperature Thrshlds. Set the low- and high-temperature alarms for the air at each of the following locations. When the air temperature at the sensor is outside the range defined by the thresholds, an alarm will occur.

Sply	Temperature thresholds for the air blown into the room (supply).
Rtrn	Temperature thresholds for the air drawn out of the room (return).

Humidity alarms

Path: Main > Setup > System # > Alarms > Humidity Thresholds

Humidity Thresholds. Set the low and high humidity alarms for the air at each of the following locations. When the relative humidity of the air at the sensor is outside the range defined by the thresholds, an alarm will occur.

Sply	Humidity thresholds for the air blown into the room (supply).
Rtrn	Humidity thresholds for the air drawn out of the room (return).

Maint intervals

Path: Main > Setup > System # > Alarms > Maint Intervals

The display interface records the number of hours each of the eight components in each Module has operated. Set the maintenance interval for each type of component in the Modules of your System. Every time the run hours for a component in a Module elapse this number of hours, an alarm will occur. Move the selector arrow next to the component name (top line of the screen), and press the ENTER key to scroll through each of the eight components.

Component name. Scroll through the components to view the maintenance intervals:

- Blower 1
- Blower 2
- Heater
- Humidifier
- Variable Frequency Drive 1 (VFD 1)
- Variable Frequency Drive 2 (VFD 2)
- Compressor 1
- Compressor 2

Alarm. Set the number of operating hours (in 100 hour increments) at which you want an alarm to occur. Set this to remind you of maintenance milestones.

Alarm delay

Path: Main > Setup > System # > Alarms > Alarm Delays

The alarm delay is the period between start-up and the enabling of alarms. The delay allows the modes (Cool, Reheat, Dehumidify, and Humidify) to take effect before alarms occur.

Temperature Delay. Set the temperature alarm delay. The maximum delay is 999 seconds (16 minutes, 39 seconds).

Humidity Delay. Set the humidity alarm delay. The maximum delay is 999 seconds (16 minutes, 39 seconds).

Coil fluid thresholds

Path: Main > Setup > System # > Alarms > Coil Fluid Thrshlds

The coil fluid coolant temperature thresholds set a range for temperatures at the coolant inlet (Water or Glycol) of the fluid coil (if equipped). An alarm occurs if the coolant temperatures move outside of this range.

Low Threshold. Set the coolant temperature at which you want a low temperature alarm to occur.

High Threshold. Set the coolant temperature at which you want a high temperature alarm to occur.

Set Up Group

Up to four NetworkAIR FM Systems can be connected to form a redundant Group. Joining Systems together to form a Group provides the following:

- Redundancy
- A way for other Systems in the Group to assist with the room load
- Demand fighting prevention (one System cooling while another reheats)
- System run time balancing
- Setpoint Sharing among Systems
- Alarm sharing among Systems



Note

Group settings are copied to each System in the Group.

Group config

Path: Main > Setup > Group > Group Config

The **Group Config** settings define the options to use in the redundant Group.

Systems. Set the number of Systems connected together to form this Group. Setting the number of Systems to 1 disables the Group functions.

Setpoint Share. Enable or disable setpoint sharing among the Systems of this Group. When setpoint sharing is enabled, changes to the cool or reheat setpoint on any System in the Group are copied to all of the other Systems.



Note

The humidify and dehumidify setpoints are always shared.

Idle Blwr Spd. Set the behavior of the blowers for Systems that are in the idle, backup, or failed states. Systems that are not active (idle, backup, or failed) should maintain blower operation in raised floor installations to maintain static pressure and to keep cool air flowing to your data center equipment rather than up through an idle NetworkAIR FM System.

Dmnd Fighting. When enabled, reheat is prohibited for all Systems in the Group, when any System in the Group has a cooling demand. This prevents Systems from working against each other.

Grp Fire Alarm. Share fire alarms among the Systems in this Group. If the **Group Fire Alarm** setting is **On**, then all Systems in the Group will shut down if a fire alarm occurs in one System. If the **Group Fire Alarm** setting is **Off**, the alarms will still be shared with the other Systems, but they will not shut down.

Grp Smoke Alarm. Share smoke alarms among the Systems in this Group. If the **Group Smoke Alarm** setting is **On**, all Systems in the Group will shut down if a smoke alarm occurs in one System.

Comm Loss Failover. Decide if the Group considers a System in the **Comm Lost** state to be failed.

- **Off** — The Group will assume that the System is still operating normally.
- **On** — A backup System will be moved to the online state.



Warning

If Runtime Balancing is enabled, Comm Loss Failover must be On. Otherwise inadvertent System shutdowns may occur.

Name. Set the name of this Group. The Group name also appears in the Network Management Card interfaces.

Group settings

Path: Main > Setup > Group > Group Settings

The **Group Settings** define the load-sharing and System role-assignment functions of the Group.

Load Share. Enable or disable load-sharing requests for each mode. If load-sharing is disabled, Systems cannot send requests for assistance to the Group.

Load Share Thrshlds. Set the load-sharing thresholds for each mode. If the environmental temperature or humidity is outside the range determined by the setpoint and threshold, the System will generate a load-sharing request. Acceptable ranges for each mode are:

Mode	Range	Share if
Cool	0.0–20.0°F (0.0–11.1 °C)	Temperature > Setpoint _{Cool} + Threshold _{Cool}
Reheat	0.0–20.0°F (0.0–11.1 °C)	Temperature < Setpoint _{Reheat} – Threshold _{Reheat}
Dehumidify	0.0–20.0% RH	Humidity > Setpoint _{Dehumidify} + Threshold _{Dehumidify}
Humidify	0.0–20.0% RH	Humidity < Setpoint _{Humidify} – Threshold _{Humidify}

Sys Role Assignment. The System Role Assignment settings depend on the **Run-time Bal** setting.

- If **Run-time Bal** is set to **On**, each System is rotated between a primary and backup role in order to spread the run hours among all of the Systems in the Group. Rotation occurs after 72 hours of operation.
 - **# Primary:** Set the number of Systems to be designated as primary. The remaining Systems in the Group will assume the backup role.
- If **Run-time Bal** is set to **Off**, you must designate the role of each System in the Group. The System will retain this role until you change the setting.
 - **Sys# Role:** Set the role for each System. Back-up Systems only operate in the event of a failure or load-sharing request (if enabled).



If Runtime Balancing is enabled, then Comm Loss Failover must be On. Otherwise inadvertent System shutdowns may occur.

Sys failure events

Path: Main > Setup > Group > Group Settings



The **System Failure Events** must be configured at each System in the Group. Unlike other Group settings, the System Failure Events list is not copied to each System in the Group.

Configure the list of **System Failure Events**. If a System failure event occurs, the System in which it occurs transitions to the failed state, and a backup System is engaged if available.

Event. Scroll through the list of possible failure events. The first line indicates whether the event is System-level or Module-level, and the second line indicates the event text.

State. Set each event to **Enabled** or **Disabled**. If an enabled event occurs in a System, that System transitions to the failed state and stops running, unless there is no backup System available to come online.

Set Up the Display

Set display settings including the time and date, temperature units, passwords, and time-out settings. You can also reset settings to their default values and download new firmware.

Password & time-out

Path: Main > Setup > System > Display > Password & Time-out



Note

The default user password is **APC** (upper-case). See “Password entry” on page 4 for more information on how to enter the password.

Change passwords. Set the passwords necessary to change System settings.

1. Move the selector arrow next to the **Change Password** option and press the ENTER key.
2. Select the password to change (either **Service** or **User**).
3. Enter your current password; once this is entered, you will return to the **Change Password** screen.
4. Enter a new password (up to 8 characters).
5. Press the ENTER key to confirm.



Note

If you do not want settings to be protected by a password, enter a blank for the password.

Password and menu time-out. Set the time-out period during which settings can be changed after the password is entered. After the period has elapsed without a keypress, password entry will be required and the display interface will return to the scrolling status screens.

Invalidate Password. Override the password time-out delay and make password entry required again with the **Invalidate NOW** option.

Date and time

Path: Main > Setup > System > Display > Date/Time

Set the date. Enter the day, month, and year, and press the ENTER key. The date is displayed on some status screens and is also used in the alarm/event log to date-stamp events.

Set the time. Enter the correct time, and press the ENTER key. The time is displayed on some status screens and is also used in the alarm/event log to time-stamp events.

Temperature & pressure units

Path: Main > Setup > System > Display > Temp/Pressure Units

Temperature units. Set the units of measure for temperature readings and settings to either Fahrenheit (°F) or Celsius (°C).

Pressure units. Set the units of measure for pressure readings and settings to either English (psig) or metric (kPa).

Adjust display

Path: Main > Setup > System > Display > Display Adjust

Set the LCD contrast. Adjust the visibility of the screen text. Lower numbered settings provide darker text; higher numbers provide lighter text. Settings range from 0–7.

Key Click. Enable or disable a beep sound every time a key is pressed on the display interface.

How to update the firmware

Path: Main > Setup > System > Display > Update Firmware

To update firmware:

1. Go to www.apc.com/tools/download/ and check for the most recent version of the firmware.
2. If a newer version is available, download it to a location that can be accessed in step 5.



Stop the System before updating the firmware. For instructions, see “Stop the System” on page 5.

Caution

3. Set up the serial connection:
 - a. Connect an available serial port of your computer to the DB-9 serial port on the electrical panel, using the supplied serial cable (APC Part Number 940-0103). To extend the cable, use APC cable number 940-1000A with 940-0103.
 - b. Run a terminal emulation program, such as HyperTerminal®.
 - c. Configure the following settings on the serial port you selected:

Baud Rate	19200
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None



Note

Some terminal emulation programs require that you disconnect and then reconnect the terminal session for the new serial port settings to take effect.

4. On the display interface, Select **YES** from the **Update Firmware** menu. Use the path you

selected in step 2.

5. In your terminal emulator, ensure that the connection is active (HyperTerminal will display a series of “C” characters) and send the file using the XMODEM protocol.
6. When the download is complete, the screen displays the new version.
7. Restart the System.

Reset to defaults

Path: Main > Setup > System # > Display > Reset to Defaults

Reset User Params. Return settings that can be modified with the user password to their factory default settings.

Reset Svc Params. Return settings that can be modified with the service password to their factory default settings.

Reset Group Params. Return Group settings that can be modified with the service password to their factory default settings.

Reset Controller. Restart the Module. Turns off the Module and then restarts it for service purposes.



The Module will not cool for several minutes during the restart process. Only trained field service personnel should use this feature.

Product data

Path: Main > Setup > System # > Display > Product Data

The **Product Data** option provides three screens of user-defined data that make identifying information available at the display interface.

Options on the **Product Data** screens include:

- Product Name
- Product Location
- Product Contact



See “Password entry” on page 4 for instructions on entering text on the display interface.

Set Up Network Configuration

Configure the network settings for Network Management Card from the display interface. The management card allows for remote control and configuration of the NetworkAIR FM Precision Air Conditioning Unit.

Network config

Path: Main > Setup > System # > Network Config

MAC Address. Displays the unique network identifier assigned to each Network Management Card at the factory.

Mode. Set the method by which the System's Network Management Card will acquire its network settings.

- **Manual** — Scroll down and enter the network settings for the System's Network Management Card.
- **BOOTP** — Set the card to obtain its network settings from a BOOTP server.
- **DHCP** — Set the card to obtain its network settings from a DHCP server.

IP. Set the IP address assigned to this System's Network Management Card (Manual mode only).

MSK. Set the subnet mask for this System's Network Management Card (Manual mode only).

GW. Set the default gateway for this System's Network Management Card (Manual mode only).

Accept Changes. You must select **Accept Changes** to save any modifications to the IP Address, subnet mask, or default gateway.

View Status Readings

The display interface has several options for viewing the status of the System, its Modules, and the environment being controlled. The status readings for Modules are available under the **Main Module** and **Expansion Module #** options, and status readings for the System are available under the **System Status** option or on the scrolling status screens.



Note

Only the Main Module of a System has a display interface. Return temperature and humidity readings displayed on the scrolling status screens are an average of the readings from each of the Modules.

If the System is off, the readings will be the values from the sensors of the Main Module.

Scrolling status screens

When the display interface is idle, it scrolls through nine screens of status information. Press the up or down arrow key to interrupt the automatic scrolling and view a specific status screen.

Module status

Paths: **Main > Status > Main Module**

Main > Status > Expansion Module 1

The Module status screens contain information for each Module in a System.

Temp & Humidity. View temperature and humidity readings at the supply, return, and remote sensors for each Module. This screen has the same format as the Temp & Humidity scrolling status screen, but the values displayed are only for the selected Module.

Pressures. View the differential pressures at the coil and the filter for this Module.

Run hours. View the total time each of the eight components have been running.

- **Clear Total:** Reset the run hours for the displayed component to zero.
- **Reset Maint Alarms:** Clear the Maintenance alarm for the displayed component. The alarm will occur when the run hours reach the next maintenance interval.



For instructions on scrolling and clearing the total hours, see “Maint Intervals” on page 32.

About Module. View identifying information that is helpful when obtaining service:

- Manufacturer Name
- Model Number
- Date of Manufacture
- Serial Number
- Firmware Revision
- Hardware Revision

Humidifier Status. View the humidifier output, current drawn by the humidifier, and the conductivity of the water in the humidifier cylinder in this Module.

Water Temps. View the coil fluid inlet temperatures for the coolant and hot water supplies (if applicable).

Blower [#] Status. View the status of blower 1 and blower 2 and the variable frequency drives that control the blowers.

Compressor Status. View the suction and discharge pressures for the Module and the operating (on or off) status of each compressor. The condenser fluid valve position is also displayed on this screen.

System status

Path: Main > Status > System #

The System status screens include information about the entire System.

Temp & Humidity. View the average temperature and humidity readings at the sensors in this System (same as the Temp & Humidity scrolling status screen).

Return Sensors	View the average temperature and humidity at the return sensors for this System.
Remote Sensors	View the minimum temperature, average temperature, average humidity, and maximum temperature for the remote sensor probes.

Demands. View the percentage of output required of a mode to maintain its setpoint in the room.

Cool/Dehumidify	View the cool mode and dehumidify mode demands (%) and the actual output. The actual reading is combined for the cool and dehumidify modes. The actual reading for the mode with the largest demand is displayed.
Reheat Demand	View the status (On/Off) of the reheat mode as well as its percentage of demanded output. The On/Off status for reheat is displayed only for Modules equipped with steam, hot water, or hot gas reheat.
Humidify Demand	View the actual and demanded output for the humidify mode.

Group status

Path: Main > Status > Group

The Group Status screen includes information about the member Systems of the Group and their roles.

Group Status. View the assigned role and current state of each System in the Group

Group Run hours. View the run hours for each System in the Group

Reset Local System Run Hours. Reset the run hours of the local System. To reset the run hours of the other Systems, you must repeat this step at each System's display interface or Network Management Card. The service password is required to perform this action.

View Event Log

The event log saves status information and a message each time a change in the System is detected. Alarms and events are recorded in the log. However, status events (informational) are only displayed on the active alarms screen.

View log

Path: Main > View Log

New Events. The **new events** option is a log of events that have occurred since the last time the log was checked.

Entire Log. The event log keeps a record of all alarms and events. Each event log entry consists of four screens of information each. The initial screen consists of the following:

- The name of the alarm
- Its index number in the log and the Module to which it applies
- The time and date the event occurred
- The name/description of the event

Use the arrow keys to scroll through the list of events.

To view more details about the event, press the ENTER key. This will allow access to three more screens (use the arrow keys to switch screens) that display the following:

- Temp and Humidity
 - Supply temperature and humidity
 - Return temperature and humidity
- Pressures
 - Discharge pressure
 - Suction pressure
- Module Status
 - Condenser fluid valve position
 - Output code (for use during service calls)

Clear Log. Erase all of the events in the log. A confirmation screen is displayed upon the selection of this option and you must enter the service password to erase the log.

Respond to Alarms

When an alarm is triggered, the Main Module alerts you through the display by the following methods:

- Alarm beeper
- Major or Minor Alarm LED
- Active alarm screen
- Alarm/Event log

Major or minor alarm LEDs

When an alarm is triggered, the Check Log LED and either the Minor Alarm LED or the Major Alarm LED activates. The Major and Minor Alarm LEDs cannot be deactivated manually; the alarm condition must be cleared to deactivate them.

Control beeper

Path: Main > Respond to Alarms

An active alarm creates a beeping sound from the display. This sound continues until you view the **Respond to Alarms** menu.

Beeper. To disable the beeper for all future alarms, set the **Beeper** setting to **Disabled**.

Beeper Volume. Set the volume of the beeper and key-click to high, medium, or low.

View active alarms

Path: Main > Respond to Alarms > View Active Alarms

The Active Alarms screen also appears on the scrolling status screens. It provides the number of the alarm (e.g. 1 of 2), a description of the condition, and a time-stamp of when the alarm happened. Press the ENTER key to view details of the alarm, or press the arrow keys to view the rest of the list.



See “Entire Log” on page 43 for more information on the alarm/event details screens.

Clear active alarms

Path: Main > Respond to Alarms > Clear Active Alarms

Clears all active alarms. If the conditions that caused the alarm still exist, those conditions cause the alarm to be regenerated.

- **Clear System Alarms** — Clear active alarms that apply to the Modules in this System.
- **Clear Group Alarms** — Clear active alarms that apply to the Group.

Reset sys failure

Path: Main > Respond to Alarms > Reset Sys Failure

Reset a System after a failure event has occurred. If the condition that caused the failure still exists, the System will fail again. A System will not restart after a failure until this command is executed.



Note

A System must be reset only if it is part of a Group. Stand-alone Systems will not go into the failure state.

Alarm messages and suggested actions

Displayed Alarm Message	Action Required
Air Block Interlock Open	<ul style="list-style-type: none"> • Verify that the air block and the unit isolation plates are in place. • Confirm that the wiring connections for the air block interlock are secure.
Air Filter Clogged	<ul style="list-style-type: none"> • Verify the condition of the return air filters, and replace them if required. • Check the pressure drop across the filters by reviewing the System status. • Ensure that the pressure-sensing tubing is properly connected to the sensors. • Verify that the ends of the pressure-sensing tubing are not blocked or placed incorrectly. • Verify that the correct filter is selected in the System Options menu (Path: Main > Setup > System # > System Config > System Options).
Airflow Low	<ul style="list-style-type: none"> • Ensure that any field-installed dampers in the discharge duct are open. • Verify that the mode delay is not too short. If the mode delay is too short, the Airflow Low alarm will occur after startup and resolve itself after a few minutes. • Check the pressure drop across the filters, and replace the filters if necessary. • Check the pressure drop across the evaporator coil on the pressures screen of the display interface (Path: Main Menu > Status > [Module] > Pressures). The reading should be close to the recommended coil differential pressure drops indicated in the table “Coil Differential Pressure Values” on page 20. If the reading is too low based on Module size and options installed, adjust the blower speed. • Verify the proper operation of the Variable Frequency Drive (VFD) and blower motors. • Verify that the VFD overload alarm is not active. • Ensure that any field-installed dampers in the discharge duct are open. • Verify that the Mode Delay is not too short. If the Mode Delay is too short, the Airflow Low alarm occurs after start-up and resolves itself after a few minutes.
Backup is Load Sharing	<ul style="list-style-type: none"> • A backup System is contributing to meet the room load. • No action required. The backup will return to idle when the demand falls.
Backup System Idle	<ul style="list-style-type: none"> • A primary System has come back online after a failover event. • No action required.
Backup System Online	<ul style="list-style-type: none"> • Indicates that a System failover has occurred. The backup System has come online due to another online System that either failed or was commanded off. A System Comm Loss is considered to be a System failure if the Comm Loss Failover configuration setting is Yes (the default setting). • Check the System’s event log to determine the cause of the System failure.
Blower 1 Requires Maintenance	<ul style="list-style-type: none"> • Verify operation of Blower 1 and perform preventive maintenance. • Reset the maintenance alarm for Blower 1 on the display interface.
Blower 2 Requires Maintenance	<ul style="list-style-type: none"> • Verify operation of Blower 2 and perform preventive maintenance. • Reset the maintenance alarm for Blower 2 on the display interface.
Compressor 1 Requires Maintenance	<ul style="list-style-type: none"> • Verify the operation of Compressor 1 and perform preventive maintenance. • Reset the maintenance alarm for Compressor 1 on the display interface.
Compressor 2 Requires Maintenance	<ul style="list-style-type: none"> • Verify the operation of Compressor 2 and perform preventive maintenance. • Reset the maintenance alarm for Compressor 2 on the display interface.

Displayed Alarm Message	Action Required
Condensate Pump Fail	<ul style="list-style-type: none"> • Verify that the condensate pump circuit breaker has not been tripped. • Ensure that the wiring between the float switch for the condensate pump and the controller is secure. • Confirm that the condensate removal lines are free of debris and are unobstructed. • Confirm the line voltage at the condensate pump. • Ensure that the condensate float switch is moving freely and does not bind. • Confirm that the condensate pump reservoir is clean and free of debris. • Replace the condensate pump.
Env Humidity High	<ul style="list-style-type: none"> • Verify that no supply air is fed directly into the return air stream. • Ensure that the alarm delay is not set too low. The delay should be long enough to allow the humidity in the room to stabilize after start-up. • Verify that the alarm threshold for the humidity of the environmental sensors (return or remote) is set above the humidify and dehumidify setpoints. • Check the capacity output of the humidifier, and reduce it if required. • Ensure that there is a proper vapor barrier within the conditioned space. • Ensure that the dehumidify mode is enabled. • Verify that the Module is configured and equipped for the dehumidify mode. • Ensure that the dehumidify mode is not disabled because of an active customer input mapped to nonessential lockout.
Env Humidity Low	<ul style="list-style-type: none"> • Ensure that the alarm delay is not set too low. The delay should be long enough to allow the humidity in the room to stabilize after start-up. • Verify that the alarm threshold for the humidity of the environmental sensors (return or remote) is not above the humidify and dehumidify setpoints. • Ensure that there is a proper vapor barrier within the conditioned space. • Verify that the Module is configured and equipped for the humidify mode. • Ensure that the humidify mode is enabled. • Check the capacity output of the humidifier, and increase it if required. • Ensure that the humidify mode is not disabled because of an active user-defined input mapped to nonessential lockout.
Env Temperature High	<ul style="list-style-type: none"> • Check whether the Module is cooling. Look for a temperature differential of 15–20°F (8–11°C) between the supply and control (return or remote) temperatures. • Ensure that there is no concentrated heat source in the return air stream of the Module. • Ensure that the alarm delay is not set too low. The delay should be long enough to allow the room temperature to stabilize after start-up. • Verify that the temperature alarm threshold for the environmental (return or remote) sensors is above the cool and reheat setpoints. • Ensure that the cooling mode is enabled. • Ensure that the cooling mode is not disabled because of an active customer input mapped to nonessential lockout.

Displayed Alarm Message	Action Required
Env Temperature Low	<ul style="list-style-type: none"> • Verify that no supply air is fed directly back into the return air. • Ensure that the alarm delay is not set too low. The delay should be long enough to allow the room temperature to stabilize after start-up. • Verify that the temperature alarm threshold for the environmental (return or remote) sensors is below the cool and reheat setpoints. • Verify that the Module is configured and equipped for the reheat mode. • Ensure that the reheat mode is enabled (if your Module is equipped with reheat). • Ensure that the reheat mode is not disabled because of an active user-defined input mapped to nonessential lockout.
Exp Module # 1 Communication Lost	<ul style="list-style-type: none"> • Verify the System CAN connections in the user interface box are connected correctly and properly terminated. • Check the CAN addresses assigned with the DIP switches on the controller board on the electrical panel. NOTE: The controller must be restarted to recognize an address change.
Exp Module # 2 Communication Lost	<ul style="list-style-type: none"> • Verify the System CAN connections in the user interface box are connected correctly and properly terminated. • Check the CAN addresses assigned with the DIP switches on the controller board on the electrical panel.
Fire Detected	<ul style="list-style-type: none"> • Follow the appropriate facility emergency protocol. NOTE: The purpose of the fire sensor is to warn you of possible equipment damage. It is NOT intended to provide a fire alarm system to protect the facility and the lives of its occupants. • Confirm that the wiring connections are secured to the wiring harness. • Verify the setting of the fire detector (firestat). • Replace the fire detector (firestat).
Fluid Coil No Coolant Flow	<ul style="list-style-type: none"> • Verify condenser coolant supply. • Check the operation of the flow switch. • Check the electrical connection to the flow switch. • Verify that the Economizer automatic coolant isolation valve is open (if equipped). • Verify that the valve type setting is correct in the System Configuration (Path: Main > Setup > System # > System Config > Valve Types).
Fluid Coil Actuator Fail	<ul style="list-style-type: none"> • Verify the proper connections between the actuator and the controller board. • Confirm that the control voltage and signal voltage reach the actuator. • Ensure that the proper Module configuration is defined for this Module, especially that the coil configuration and the Multi/Econ actuator type are correct. • Replace the fluid coil actuator.
Fluid Coil Coolant Temp High	<ul style="list-style-type: none"> • For Economizer units, check the operation of the outdoor heat exchanger. • For MultiCool units, check the chilled water supply temperature. • Verify that the fluid coil coolant temperature high threshold is not set below the normal temperature of your chilled water supply.
Fluid Coil Coolant Temp Low	<ul style="list-style-type: none"> • For Economizer units, check the operation of the outdoor heat exchanger. • For MultiCool units, check the chilled water supply temperature. • Verify that the fluid coil coolant temperature low threshold is not set above the normal temperature of your chilled water supply.

Displayed Alarm Message	Action Required
Group Configuration Invalid	<ul style="list-style-type: none"> Check that the # Systems setting (Path: Main > Setup > Group > Group Config) agrees with the actual number of Systems connected to the Group. Increase this setting to match the number of connected Systems.
Group Configuration Conflict	<ul style="list-style-type: none"> Verify the Group configuration settings (Path: Main > Setup > Group) are correct. The Group detected one or more Systems in the Group to have different Group configuration settings and changed that System's settings.
Group Fatal Fire Shutdown	<ul style="list-style-type: none"> Check the Systems in this Group for fire alarms. The Group Fatal Fire Shutdown occurs only when the Group Fire Alarm configuration setting (Path: Main > Setup > Group Config > Grp Fire Alarm) is On. While the fire alarm is active, the Group will remain shut down.
Group Fatal Smoke Shutdown	<ul style="list-style-type: none"> Check the Systems in this Group for smoke alarms. The Group Fatal Smoke Shutdown occurs only when the Group Smoke Alarm configuration setting (Path: Main > Setup > Group Config > Grp Smoke Alarm) is On. While the smoke alarm is active, the Group will remain shut down.
Head Pressure High	<ul style="list-style-type: none"> Confirm that the air-cooled condenser or fluid cooler is operating properly and that the setpoints are correct. Confirm (water/glycol cooled) that the condenser loop pumps are operating properly. Ensure that the air-cooled condenser/fluid cooler is free from debris on the air intake side. Verify that all isolation valves to the condenser loop or interconnecting piping are open. Confirm (water/glycol) that all air has been purged from the condenser loop. Confirm (glycol) that the glycol to water concentration is 40% glycol to 60% water. Verify the interconnecting wiring between the indoor Module and outside heat exchanger. Verify (water/glycol) correct operation of the condenser fluid valve actuator. Confirm proper refrigerant charge in the Module. Ensure that the Module is set to the proper heat of rejection method on the display interface (Path: Main Menu > Setup > System # > System Config > System Options). Verify (water/glycol) that the strainers are clear and open. Confirm the proper operation and trip point of the high head pressure switch. Verify that the Economizer isolator valve is open (if installed).
Heater Requires Maintenance	<ul style="list-style-type: none"> Verify the operation of the heater and perform preventive maintenance. Reset the maintenance alarm on the display interface for the heater.
Humidifier Current High	<ul style="list-style-type: none"> Verify that the proper voltage is being applied to the humidifier cylinder. Confirm that there are secure and proper line voltage connections to cylinder. Ensure that the humidifier water supply has not been conditioned. Conditioning can increase the water conductivity. Check the electrodes in the humidifier cylinder for mineral buildup that bridges the electrodes. Check the fill and drain valves for leaks.
Humidifier Cylinder Depleted	<ul style="list-style-type: none"> Replace the disposable cylinder. Clean the reusable humidifier cylinder (optional).

Displayed Alarm Message	Action Required
Humidifier Cylinder Full When Off	<ul style="list-style-type: none"> • Check the humidifier drain valve for clogging. • Check the operation of the humidifier drain solenoid.
Humidifier Drain Malfunction	<ul style="list-style-type: none"> • Ensure that the drain is free of any debris. • Verify the operation of the drain solenoid valve.
Humidifier Excessive Foam	<ul style="list-style-type: none"> • Verify that the humidifier water supply is not using conditioned water and that the water does not contain contaminants. • Check the humidifier water supply hose for dirt and contaminants. • Check the steam supply hose for kinks that may cause back pressure.
Humidifier Excessive Output Reduction	<ul style="list-style-type: none"> • Reduce the humidifier sensitivity setting on the display interface (Path: Main > Setup > System # > System Config > Humid. Sensitivity) if necessary.
Humidifier Fail	<ul style="list-style-type: none"> • Check the Event log for other humidifier alarms.
Humidifier Fault Tolerance Exceeded	<ul style="list-style-type: none"> • Humidifier has experienced three faults within one-half hour. • Reset the humidifier from the display interface (Path: Main > Setup > Module > [Module Alarm Occurred in] > Module Control > Reset Humidifier).
Humidifier Internal Memory Error	<ul style="list-style-type: none"> • Check the controller connections to the humidifier for electrical discharge.
Humidifier No Power	<ul style="list-style-type: none"> • Verify that the humidifier circuit breaker has not been tripped. • Confirm that the line voltage connections to the cylinder are secure and correct.
Humidifier Requires Maintenance	<ul style="list-style-type: none"> • Verify the operation of the humidifier and perform preventive maintenance. • Reset the maintenance alarm on the display interface for the humidifier.
Humidifier Water Conductivity High	<ul style="list-style-type: none"> • Verify that the proper voltage is being applied to the humidifier cylinder. • Confirm that the line voltage connections to the cylinder are secure and correct. • Ensure that the water supply to the humidifier has not been conditioned. Conditioned water can increase water conductivity.
Humidifier Water Level Low	<ul style="list-style-type: none"> • Verify that the humidifier water supply is open and flowing to the humidifier water connection. • Confirm that the inlet water strainer on the humidifier fill solenoid is clear and free of debris. • Ensure that the water pressure is at least at 30 psig (206 kPa). • Verify the operation of the fill solenoid valve.
Module # Failed	<ul style="list-style-type: none"> • Check the Event log for other alarms for this Module.
Module Powered Up	<ul style="list-style-type: none"> • The module has successfully started.
MultiCool Coil No Coolant Flow	<ul style="list-style-type: none"> • Verify the flow from the chilled water supply. • Check the operation of the flow switch. • Check the electrical connections to the flow switch. • Verify that the chilled water supply isolation valve is open.
No Backup Systems Available	<ul style="list-style-type: none"> • Check the number of Systems designated for the backup role. • Check that the backup Systems are not failed, in the Comm Lost state, or Off.

Displayed Alarm Message	Action Required
Primary Sensors Failed	<ul style="list-style-type: none"> • Verify that there is a proper CAN connection between the sensors and the user interface box. • Replace the sensor assembly.
Remote Sensor Removed	<ul style="list-style-type: none"> • Check the CAN bus connection to the remote sensors. • Disregard if you removed the remote sensor.
Remote Sensor Added	<ul style="list-style-type: none"> • Check the CAN bus connection to the remote sensors. • Disregard if you added the remote sensor.
Replace Steam Cylinder	<ul style="list-style-type: none"> • Replace the steam cylinder. • Clean the steam cylinder (if cylinder is the cleanable option).
Return Sensor Fail	<ul style="list-style-type: none"> • Verify that there is a proper CAN connection between the sensors and the user interface box. • Replace the sensor assembly.
Secondary Sensors Failed	<ul style="list-style-type: none"> • Verify that there is a proper CAN connection between the sensors and the user interface box. • Replace the sensor assembly.
Return Sensor Fail	<ul style="list-style-type: none"> • Verify that there is a proper CAN connection between the sensors and the user interface box. • Replace the sensor assembly.
Smoke Detected	<ul style="list-style-type: none"> • Confirm that the wiring connections are secure to the wiring harness. • Ensure smoke head and sub-base are properly attached. • Ensure that there is not dirt or dust on the smoke head. Use pressurized air to clean smoke head chamber. • Replace the smoke detector.
Suction Pressure Low	<ul style="list-style-type: none"> • Confirm (on the display interface) that the pressure drop across the evaporator coil is within the acceptable range (Path: Main Menu > Status > [Main or Expansion] Module > Pressures). • Confirm that the cooling setpoint is not below 68°F (20°C). • Verify the condition of the return filters. Check (on the display interface) the pressure drop across the filters (Path: Main Menu > Setup > System > System Config > System Options). • Confirm that the outdoor heat exchanger is operating properly and that its setpoints are correct. • Confirm proper refrigerant charge in the Module. • Confirm proper Module set-up and that the correct Module size is indicated on the display interface. • Verify that the evaporator coil is clean and free of debris.

Displayed Alarm Message	Action Required
Supply Humidity High	<ul style="list-style-type: none"> • Verify that the suction pressure is not below 58 psig (400 kPa). • Ensure that the alarm delay is not set too low. The delay should be long enough to allow the Module to control the humidity after start-up. • Ensure that the alarm threshold for the humidity of the supply air is set above the humidify and dehumidify setpoints. • Verify that there is proper airflow through the Module (check the pressure drop across the evaporator coil). • Check the capacity output of the humidifier and reduce it if required. • Ensure that there is a proper vapor barrier within the conditioned space. • Verify that the Module is configured and equipped for the dehumidify mode. • Ensure that the dehumidify mode is enabled. • Ensure that the dehumidify mode is not disabled because of an active customer input mapped to nonessential lockout.
Supply Humidity Low	<ul style="list-style-type: none"> • Ensure the alarm delay is not set too low. The delay should be long enough to allow the Module to control the humidity after start-up. • Ensure that the alarm threshold for the humidity of the supply air is set below the humidify and dehumidify setpoints. • Check the capacity output of the humidifier and increase it if required. • Ensure that there is a proper vapor barrier within the conditioned space. • Verify that the Module is configured and equipped for the humidify mode. • Ensure that the humidify mode is enabled. • Ensure that the humidify mode is not disabled because of an active customer input mapped to nonessential lockout.
Supply Sensor Fail	<ul style="list-style-type: none"> • Verify that there is a proper CAN connection between sensors and the user interface box. • Replace the sensor assembly.
Supply Temperature High	<ul style="list-style-type: none"> • Ensure that the alarm delay is not set too low. The delay should be long enough to allow the Module to control the temperature after start-up. • Verify that the supply air temperature alarm threshold is set above the cool and reheat setpoints. • Verify that there is proper airflow through the Module (check the pressure drop across the evaporator coil). • Ensure that the cool mode is enabled. • Ensure that the cool mode is not disabled because of an active customer input mapped to nonessential lockout.
Supply Temperature Low	<ul style="list-style-type: none"> • Ensure that the alarm delay is not set too low. The delay should be long enough to allow the Module to control the temperature after start-up. • Verify that the Module is configured and equipped for the reheat mode. • Ensure that the supply air temperature alarm threshold is set below the reheat and cool setpoints. • Ensure that the reheat mode is enabled. • Ensure that the reheat mode is not disabled because of an active customer input mapped to nonessential lockout. • Verify that there is proper airflow through the Module (check the pressure drop across the evaporator coil).

Displayed Alarm Message	Action Required
System Comm Lost	<ul style="list-style-type: none"> • Check that the System is receiving power. • Check the external CAN bus connections. • Check the System ID DIP switch settings of every Main Module in the Group. Each Main Module must have a unique address. See the <i>Installation Manual</i> for the correct DIP switch settings.
System Failure	<ul style="list-style-type: none"> • After correcting the cause of the system failure, perform a Reset System Failure command (Path: Main > Respond to Alarms > Reset Sys Failure).
System Fire Detected	<ul style="list-style-type: none"> • Follow the appropriate facility emergency protocol. NOTE: The purpose of the fire sensor is to warn you of possible equipment damage. It is NOT intended to provide a fire alarm system to protect the facility and the lives of its occupants. • See “Fire Detected” on page 48 for the appropriate alarm actions.
System Off	<ul style="list-style-type: none"> • Turn on power to the System (Path: Main > On/Off).
System Smoke Detected	<ul style="list-style-type: none"> • Check the Modules in the System for Smoke Detected alarms. • Follow the appropriate facility emergency protocol. NOTE: The purpose of the smoke sensor is to warn you of possible equipment damage. It is NOT intended to provide a smoke alarm system to protect the facility and the lives of its occupants. • See “Smoke Detected” on page 51 for the appropriate alarm actions.
VFD # 1 Requires Maintenance	<ul style="list-style-type: none"> • Verify the operation of VFD # 1 and perform preventive maintenance. • Reset the maintenance alarm for VFD #1 on the display interface.
VFD # 2 Requires Maintenance	<ul style="list-style-type: none"> • Verify the operation of VFD # 2 and perform preventive maintenance. • Reset the maintenance alarm for VFD #2 on the display interface.
VFD 1 Fail	<ul style="list-style-type: none"> • Check the event log for other VFD alarms to determine the cause of the failure.
VFD 2 Fail	<ul style="list-style-type: none"> • Check the event log for other VFD alarms to determine the cause of the failure.
Water Detected	<ul style="list-style-type: none"> • Determine the source of the leak, and repair it. • Confirm that the water detector is not short-circuited to metal and ensure that there is not debris or soldering on the rope component of the water detector that could be providing false detection. • Ensure that the water detector is properly mounted and secured to the bottom of the Module or the floor. • Confirm that the wiring connections are secure. • Replace the water detector.

Network Management Card

Quick Configuration

The APC NetworkAIR FM Precision Air Conditioner is shipped with a Network Management Card that provides for the management of the Air Conditioner over your network. You must set up the Network Management Card in order to control the APC NetworkAIR FM Precision Air Conditioner through a web browser.



Disregard the procedures in this section if you have APC InfraStruXure Manager as part of your system. See the InfraStruXure Manager documentation for more information.

Overview

You must configure the following TCP/IP settings before the Network Management Card can operate on a network:

- IP address of the Network Management Card
- Subnet mask
- Default gateway



Note

If a default gateway is unavailable, use the IP address of a computer that is located on the same subnet as the Network Management Card and that is usually running. The Network Management Card uses the default gateway to test the network when traffic is very light.



See also

See “Watchdog Features” in the “Introduction” of the NetworkAIR FM *User’s Guide* for more information about the watchdog role of the default gateway.

TCP/IP configuration methods

Use one of the following methods to define the TCP/IP settings needed by the Network Management Card:

- APC Device IP Configuration Wizard (See “APC Device IP Configuration Wizard” on page 56.)
- BOOTP or DHCP server (See “BOOTP & DHCP configuration” on page 56.)
- Local computer (See “Local access to the control console” on page 59.)
- Networked computer (See “Remote access to the control console” on page 59.)

APC Device IP Configuration Wizard

You can use the APC Device IP Configuration Wizard at a Windows NT[®] 4.0, Windows 2000, Windows 2003, or Windows XP computer to configure a Network Management Card.



See also

To configure one or more Network Management Cards by exporting configuration settings from a configured Network Management Card, see “How to Export Configuration Settings” in the *User’s Guide* on the NetworkAIR FM and NetworkAIR IR Precision Air Conditioner CD.

1. Insert the NetworkAIR FM and NetworkAIR IR Precision Air Conditioner CD into a computer on your network.
2. Select the Device IP Configuration Wizard from the main menu.
3. Wait for the Wizard to discover the first unconfigured Network Management Card, then follow the on-screen instructions.



Note

If you leave the **Start a Web browser when finished** option enabled, you can use **apc** for both the user name and password to access the Network Management Card through your browser.

BOOTP & DHCP configuration

The **Boot Mode** Setting, a **TCP/IP** option in the Network Management Card’s **Network** menu, identifies how the TCP/IP settings will be defined. The possible settings are **Manual**, **DHCP only**, **BOOTP only**, and **DHCP & BOOTP** (the default setting).



The **DHCP & BOOTP** setting assumes that a properly configured DHCP or BOOTP server is available to provide TCP/IP settings to Network Management Cards. If these servers are unavailable, see “APC Device IP Configuration Wizard” on this page, “Local access to the control console” on page 59, or “Remote access to the control console” on page 59 to configure the needed TCP/IP settings.

With **Boot Mode** set to DHCP & BOOTP (the default setting), the Network Management Card attempts to discover a properly configured server. It first searches for a BOOTP server, then a DHCP server, and repeats this pattern until it discovers a BOOTP or DHCP server.



See “BOOTP” on page 57 or “DHCP” on page 58.

BOOTP. You can use an RFC951-compliant BOOTP server to configure the TCP/IP settings for the Network Management Card.



The **BOOTP only** setting assumes that a properly configured BOOTP server is available to provide TCP/IP settings to APC Network Management Cards. If a BOOTP server is unavailable, see “APC Device IP Configuration Wizard” on page 56, “Local access to the control console” on page 59, or “Remote access to the control console” on page 59 to configure the TCP/IP settings.

1. Enter the Network Management Card’s MAC and IP addresses, the subnet mask and default gateway settings, and an optional bootup file name in the BOOTPTAB file of the BOOTP server.



Note

For the MAC address, look on the nameplate of the NetworkAIR FM Precision Air Conditioner.

2. When the Network Management Card reboots, the BOOTP server provides it with the TCP/IP settings.
 - If you specified a bootup file name, the Network Management Card attempts to transfer that file from the BOOTP server using TFTP or FTP. The Network Management Card assumes all settings specified in the bootup file.
 - If you did not specify a bootup file name, the Network Management Card can be configured remotely by using the control console or the Web interface (user name and password are both **apc**, by default).



See also

To create the bootup file, see your BOOTP server documentation.

DHCP. You can use a RFC2131/RFC2132-compliant DHCP server to configure the TCP/IP settings for the Network Management Card.



See also

This section briefly summarizes the Network Management Card communication with a DHCP server. For more detail about how a DHCP server is used to configure the network settings for a Network Management Card, see “DHCP Configuration” in the NetworkAIR FM *User’s Guide*.

1. A Network Management Card sends out a DHCP request that uses the following to identify itself:
 - A Vendor Class Identifier (APC by default)
 - A Client Identifier (by default, the Network Management Card’s MAC address value)
 - A User Class Identifier (by default, the identification of the Network Management Card’s application firmware)
2. A properly configured DHCP server responds with a DHCP offer that includes all of the settings that the Network Management Card needs for network communication. The DHCP offer also includes the Vendor Specific Information option (DHCP option 43). By default, the Network Management Card will ignore DHCP offers that do not encapsulate the APC cookie in the Vendor Specific Information option using the following hexadecimal format:

Option 43 = 01 04 31 41 50 43

where

- the first byte (01) is the code
- the second byte (04) is the length
- the remaining bytes (31 41 50 43) are the APC cookie



See your DHCP server documentation to add code to the Vendor Specific Information option. To disable the APC cookie requirement, see “Local access to the control console” on page 59.

To change the control console’s **DHCP Cookie Is** setting, use the **Advanced** option in the TCP/IP menu. See “Remote access to the control console” on page 59.

Local access to the control console

You can use a local computer that connects to the Network Management Card through the serial port on the front of the Network Management Card to access the control console. The procedure requires the front door and electrical panel of the APC NetworkAIR FM Precision Air Conditioner to be open, which creates an electrical hazard. Therefore, whenever possible access the control panel through a network connection. Select a serial port at the local computer, and disable any service that uses that port.

1. Use the configuration cable (940-0103) to connect the selected port to the serial port (J2) on the controller board. The controller board is in the right compartment of the electrical panel.



Do not touch components on the electrical panel, other than the serial port.

2. Run a terminal program (such as HyperTerminal) and configure the selected port for 2400 bps, 8 data bits, no parity, 1 stop bit, and no flow control, and save the changes.
3. Press ENTER to display the **User Name** prompt.
4. Use **apc** for the user name and password.
5. See “Control console” on page 60 to finish the configuration.

Remote access to the control console

From any computer on the same subnet as the Network Management Card, you can use ARP and Ping to assign an IP address to a Network Management Card, and then use Telnet to access that Network Management Card’s control console and configure the needed TCP/IP settings.



Note

After a Network Management Card has its IP address configured, you can use Telnet, without first using ARP and Ping, to access that Network Management Card.

1. Use ARP to define an IP address for the Network Management Card, and use the Network Management Card’s MAC address in the ARP command. For example, to define an IP address of 156.205.14.141 for a Network Management Card that has a MAC address of 00 c0 b7 63 9f 67, use one of the following commands:

– Windows command format:

```
arp -s 156.205.14.141 00-c0-b7-63-9f-67
```

– LINUX command format:

```
arp -s 156.205.14.141 00:c0:b7:63:9f:67
```



Note

For the MAC address, look on the nameplate of the APC NetworkAIR FM Precision Air Conditioner.

2. Use Ping with a size of 113 bytes to assign the IP address defined by the ARP command. For the IP address defined in step 1, use one of the following Ping commands:

– Windows command format:

```
ping 156.205.14.141 -l 113
```

– LINUX command format:

```
ping 156.205.14.141 -s 113
```

3. Use Telnet to access the Network Management Card at its newly assigned IP address. For example:

```
telnet 156.205.14.141
```

4. Use **apc** for both user name and password.
5. See “Control console” on page 60 to finish the configuration.

Control console

After you log on at the control console, as described in “Local access to the control console” on page 59 or “Remote access to the control console” on page 59:

1. Choose **Network** from the **Control Console** menu.
2. Choose **TCP/IP** from the **Network** menu.
3. If you are not using a BOOTP or DHCP server to configure the TCP/IP settings, select the **Boot Mode** menu. Select **Manual boot mode**, and then press ESC to return to the **TCP/IP** menu. (Changes will take effect when you log out.)
4. Set the **System IP**, **Subnet Mask**, and **Default Gateway** address values.
5. Press CTRL-C to exit to the **Control Console** menu.
6. Log out (option 4 in the **Control Console** menu).



Note

If you disconnected a cable during the procedure described in “Local access to the control console” on page 59, reconnect that cable and restart the associated service.

How to Access a Configured Unit

Overview

After the Network Management Card is running on your network, you can use the interfaces summarized here to access the APC NetworkAIR FM Precision Air Conditioner.



See also

For more information on the interfaces, see the *User's Guide*.

Web interface

As your browser, you can use Microsoft® Internet Explorer 5.0 (and higher) or Netscape® 4.0.8 (and higher, except Netscape 6.x) to access the Management Card through its Web interface. Other commonly available browsers also may work but have not been fully tested by APC.

To use the Web browser to configure NetworkAIR FM options or to view the event log, you can use either of the following:

- The HTTP protocol (enabled by default) provides authentication by user name and password but no encryption.
- The more secure HTTPS protocol provides extra security through Secure Sockets Layer (SSL) and encrypts user names, passwords, and data being transmitted. It also provides authentication of Network Management Cards by means of digital certificates.

To access the Web interface and configure the security of your device on the network:

1. Address the Network Management Card by its IP address or DNS name (if configured).
2. Enter the user name and password (by default, **apc** and **apc** for an Administrator, or **device** and **apc** for a Device Manager).
3. Select and configure the type of security you want. (This option is available only for Administrators.)



See also

See “Security” in the *User's Guide* for information on choosing and setting up your network security. Use the **Web/SSL** option of the **Network** menu to enable or disable the HTTP or HTTPS protocols.

Telnet/SSH

You can access the control console through Telnet or Secure SHell (SSH), depending on which is enabled. (An Administrator can enable these access methods through the **Telnet/SSH** option of the **Network** menu.) By default, Telnet is enabled. Enabling SSH automatically disables Telnet.

Telnet for basic access. Telnet provides the basic security of authentication by user name and password, but not the high-security benefits of encryption. To use Telnet to access an APC NetworkAIR FM Precision Air Conditioner's control console from any computer on the same subnet:

1. At a command prompt, use the following command line, and press ENTER:

```
telnet address
```

As *address*, use the Network Management Card's IP address or DNS name (if configured).

2. Enter the user name and password (by default, **apc** and **apc** for an Administrator, or **device** and **apc** for a Device Manager).

SSH for high-security access. If you use the high security of SSL for the Web interface, use Secure SHell (SSH) for access to the control console. SSH encrypts user names, passwords and transmitted data.

The interface, user accounts, and user access rights are the same whether you access the control console through SSH or Telnet, but to use SSH, you must first configure SSH and have an SSH client program installed on your computer.



See also

See the *User's Guide* for more information on configuring and using SSH.

SNMP

After you add the PowerNet MIB to a standard SNMP MIB browser, you can use that browser for SNMP access to the Network Management Card. The default read community name is **public**; the default read/write community name is **private**.



Note

If you enable SSL and SSH for their high-security authentication and encryption, disable SNMP. Allowing SNMP access to the Network Management Card compromises the high security you implement by choosing SSL and SSH. To disable SNMP, you must be an Administrator; use the **SNMP** option of the **Network** menu.

FTP/SCP

You can use FTP (enabled by default) or Secure CoPy (SCP) to transfer new firmware to the Network Management Card, or to access a copy of the NetworkAIR FM's event logs. SCP provides the higher security of encrypted data transmission and is enabled automatically when you enable SSH.

**Note**

If you enable SSL and SSH for their high-security authentication and encryption, disable FTP. Allowing file transfer to the NetworkAIR FM through FTP compromises the high security you implement by choosing SSL and SSH. To disable FTP, you must be an Administrator; use the **FTP Server** option of the **Network** menu.

To access the Network Management Card through FTP or SCP, the default user name and password are **apc** and **apc** for an Administrator, or **device** and **apc** for a Device Manager. In the command line, use the IP address of the unit.

**See also**

See the *User's Guide* to use FTP or SCP to transfer firmware files to or to retrieve the log file from the Network Management Card.

How to Recover From a Lost Password

To access the control console, you can use a local computer or a computer that connects to the Network Management Card or other device through the serial port.

1. Select a serial port at the local computer, and disable any service that uses that port.
2. Use the configuration cable (940-0103) to connect the selected port to the serial port (J2) on the controller board. The controller board is in the right compartment of the electrical panel.



Do not touch components on the electrical panel, other than the serial port.

3. Run a terminal program (such as HyperTerminal®) and configure the selected port as follows:
 - 2400 bps
 - 8 data bits
 - no parity
 - 1 stop bit
 - no flow control.
4. Press ENTER, repeatedly if necessary, to display the **User Name** prompt. If you are unable to display the **User Name** prompt, verify the following:
 - The serial port is not in use by another application.
 - The terminal settings are correct as specified in step 3.
 - The correct cable is being used as specified in step 2.
5. Press the **Reset** button on the faceplate of the Network Management Card. The Status LED will flash alternately orange and green. Press the **Reset** button a second time immediately while the LED is flashing to reset the user name and password to their defaults temporarily.
6. Press ENTER as many times as necessary to re-display the **User Name** prompt, then use the default, **apc**, for the user name and password. (If you take longer than 30 seconds to log on after the **User Name** prompt is re-displayed, you must repeat step 5 and log on again.)

7. From the **Control Console** menu, select **System**, then **User Manager**.
8. Select **Administrator**, and change the **User Name** and **Password** settings, both of which are now defined as **apc**.
9. Press CTRL-C, log off, reconnect any serial cable you disconnected, restart any service you disabled, close all panels, and re-install doors.



Do not touch components on the electrical panel, other than the serial port.

How to Upgrade Firmware



See also

For a complete description of how to download a firmware upgrade for your Network Management Card and transfer it to the unit, see the *User's Guide* on the provided NetworkAIR FM and NetworkAIR IR Precision Air Conditioner CD.

For you to be able to use FTP to upgrade a single Network Management Card over the network:

- The Network Management Card must be attached to the network.
- The FTP server must be enabled at the Network Management Card.
- The Network Management Card must have its TCP/IP settings (**System IP**, **Subnet Mask**, and **Default Gateway** addresses) configured.

To use FTP to upgrade the Network Management Card:

1. Open an MS-DOS command prompt window on a computer that is connected to the network. Go to the directory that contains the firmware upgrade files, and list the files. (For the directory C:\apc, the commands would be those shown in **bold**:

```
C:\>cd\apc  
C:\apc>dir
```

Files listed for a NetworkAIR FM Precision Air Conditioner, for example, might be the following:

```
- apc_hw02_aos_260.bin  
- apc_hw02_nairfm_264.bin
```

2. Open an FTP client session:

```
C:\apc>ftp
```

3. Type open and the Network Management Card's IP address, and press ENTER. If the **Port** setting for **FTP Server** in the **Network** menu has changed from its default value of **21**, you must use the non-default value in the FTP command.
 - a. For some FTP clients, use a colon to add the port number to the end of the IP address.
 - b. For Windows FTP clients, separate the port number from the IP address by a space. For example, if the Network Management Card's **FTP Server Port** setting has been changed from its default of **21**, such as to **21000**, you would use the following command for a Windows FTP client transferring a file to a Network Management Card with an IP address of 150.250.6.10.

```
ftp> open 150.250.6.10 21000
```
4. Log on using the Administrator user name and password (**apc** is the default for both).

5. Upgrade the AOS. For example:

```
ftp> bin  
ftp> put apc_hw02_aos_260.bin
```

6. When FTP confirms the transfer, type **quit** to close the session.
7. Wait 20 seconds, and then repeat step 2 through step 5 for the application module. In step 5, use the application module file instead of the AOS module.

Maintenance

Monthly Preventive Maintenance

The following pages can be photocopied and used during the maintenance procedures. After they have been filled out, save for future reference.

Prepared by: _____

Model Number: _____

Serial Number: _____

Date: _____

Environment

- ☐ What type of room is the Module located in?

- ☐ Is the Module maintaining the temperature/humidity setpoint?

 - Temperature setpoint _____
 - Humidity setpoint _____
- ☐ Is there visible damage to the Module (dents, scratches)?

- ☐ Check for environmental damage (dirt, dust, debris, liquid stains) around the Module installation area.

- ☐ Record the room temperature/humidity near the return of the Module.
 - Temperature _____
 - Humidity _____
- ☐ Record last month's alarm history.

Cleanliness

- ☐ Check the condenser/fluid-cooler coil for cleanliness. Clean if necessary.
- ☐ Check the condition of return air filters. Change if necessary.
- ☐ Check the condition of drain pan and accumulation of debris in the pan. Clean as required.

Mechanical

- ☐ Check the evaporator fan/motors. All components should be moving freely with no signs of binding or damages.
- ☐ Check the condenser fan/motors. All components should be moving freely with no signs of binding or damages.
- ☐ Inspect the set-screws on fan blades, pulleys, and bushings to make sure that they are tight.
- ☐ Verify that the condensate line is flowing freely.
- ☐ Verify that the humidification system does not have leaks at the fill and drain valves and that the modes of operation are functional.
- ☐ Ensure that there are no kinks in the steam delivery system from the cylinder top to the steam distributor.
- ☐ On optional cleanable cylinders, check for build-up in the cylinder and clean as required.
 - Cylinder size _____
- ☐ Replace disposable humidifier cylinders as required.
 - Cylinder size _____
- ☐ Visually inspect the liquid line sight glass for excessive bubbles (when full cool) and condition of moisture indicator.
- ☐ Verify the chilled water supply temperature for chilled water modules with the MultiCool option.
 - Chilled water supply temperature _____

Electrical

- ☐ Inspect the electrical panel for tight connections and overheated connections from loose contact terminals.
- ☐ Confirm that the incoming main power matches the Module nameplate. Measurement should be within 10% of nameplate listing.
- ☐ Verify the control voltage. Voltage should be within 10% of 24V.

Quarterly Preventive Maintenance

* Perform all the Monthly Preventive Maintenance items **and** the items below.

Prepared by: _____

Model Number: _____

Serial Number: _____

Date: _____

Mechanical

- ☐ Check the refrigeration and water/glycol lines for leaks.
- ☐ Verify that the blower/motor evaporator hardware is tight.

Electrical

- ☐ Record the amperages for the following components.

Component	L1	L2	L3	FLA
Evaporator fan motors				
Motor #1				
Motor #2				
Condenser fan motors				
Motor #1				
Motor #2				
Motor #3				
Motor #4				
Compressors				
Compressor A				
Compressor B				
Reheat				
Humidifier				
Glycol pumps				
Pump #1				
Pump #2				

Functional tests

- ☐ Verify the following modes of operation:
 - Full cooling
 - Full reheat
 - Humidification
 - Dehumidification
 - MultiCool
 - Economizer
- ☐ Verify the operation of these actuators:
 - Chilled water
 - MultiCool (optional)
 - Hot water reheat (optional)
 - Head pressure control valve (water/glycol Modules)

Semi-Annual Preventive Maintenance

* Perform all the Monthly/Quarterly Preventive Maintenance items **and** the items below.

Prepared by: _____

Model Number: _____

Serial Number: _____

Date: _____

Cleanliness

- ☐ Check the cleanliness of the evaporator coil. Clean if required.

Mechanical

- ☐ Check the glycol concentrate of the glycol loop (glycol Modules only).
 - Glycol % _____
 - Water % _____

Electrical

- ☐ Verify contactor and relay operation integrity.
- ☐ Check the main power wiring for the following components:
 - Reheat elements
 - Evaporator and condenser motors
 - Compressors
 - Humidifiers
 - Glycol pumps

Functional tests

- ☐ Measure the refrigerant pressures.

	Head Pressure		Suction Pressure	
Compressor on				
Compressors on				

- ☐ Check the operation of the thermal expansion valve. Verify superheat and sub-cooling of the System in full cool:
 - Superheat _____
 - Sub-cooling _____
- ☐ Check the operation of the head pressure switch:
 - Cut-out PSI (kPa)_____
- ☐ Verify the operation of the water/glycol regulating valves:
 - Pressure set PSI (kPa)_____
- ☐ Check the operation of all System alarms.
- ☐ Verify the operation of the glycol pump package and auto-changeover function (if applicable).
- ☐ Confirm the operation of the fluid-cooler/air-cooled condenser and the flooded head pressure of the Redundant Group and change over capabilities, if used.

Troubleshooting

Refrigeration

Problem	Possible Cause	Corrective Action
Controls erratic or inoperative	• Incorrect secondary voltage	• Check control transformer secondary voltage. It should be within +/- 10% of 24 VAC.
	• Remote shutdown input is cycling the Module on and off	• Check the event log for an entry in the log that indicates remote shut down activity.
Evaporator coil ices	• Lack of proper airflow across coil	• Check the pressure drop across return air filters through the display interface. If the pressure drop is greater than 0.75" (180 Pa) for 30% filters or 1.0" (250 Pa) for 85% filters, replace the return air filters with new ones. • Check the Evaporator coil pressure drop through the display interface. The pressure drop should match recommended pressure drops indicated on the chart based on the Module size. If the pressure drop is below the recommended settings, increase the blower speed until the pressure drop matches the recommended setting.
	• Incorrect Module set-up	• The Module configuration may be set to a smaller size Module. Check Module size on the display interface, compared to the nameplate.
	• Cooling set-point too low	• Verify that the cooling setpoint is not below 68°F (20°C).
	• Refrigerant charge is low	• Verify the condition of the liquid line sight glass. There should be minimal bubbles seen at the sight glass. Presence of excessive bubbles indicates the refrigerant charge is low.
Evaporator motor fails to start	• Control circuit breaker is tripped	• Reset the control circuit breaker.
	• Frequency Drive is in alarm or failed	• Check the event log for a VFD alarm entry. Replace the frequency drive.

Problem	Possible Cause	Corrective Action
Compressor fails to start	<ul style="list-style-type: none"> • Cooling setpoint too high • Compressor circuit breaker is open • Low pressure switch is open • Head pressure too high, high pressure switch open • Liquid line solenoid not opening 	<ul style="list-style-type: none"> • Adjust the cooling setpoint below the return air temperature by at least 4°F (2°C) to activate compressor/compressors. • Reset the circuit breaker and check the compressor contactor load side for proper voltage to compressor. Check compressor windings and verify open or short to ground windings. • Verify the condition of the liquid line sight glass. There should be minimal bubbles seen at the sight glass. Presence of excessive bubbles indicates the refrigerant charge is low. Possible refrigerant leak. • Check the condenser for air obstructions and proper operation. Manually reset the high pressure switch. • Check for control power to the solenoid. If present, there should be a magnetic pull felt at the top of the solenoid coil. This can be verified by placing a metal screwdriver tip on the top of the solenoid. If a magnetic pull is present, the coil is good and there may be an obstruction in the valve body. Pulling the solenoid coil off of the solenoid valve body several times may free the obstruction. If this does not open the flow of refrigerant then the solenoid valve will have to be inspected internally.
Noisy compressor	<ul style="list-style-type: none"> • Compressors may be rotating in the wrong direction. 	<ul style="list-style-type: none"> • Verify the pressure differential across the suction and discharge for both compressors. If none or minimal is present, verify the correct phasing to compressors.
System short of capacity	<ul style="list-style-type: none"> • Expansion valve is stuck or possibly obstructed or power head is bad • Room load is larger than Module capacity 	<ul style="list-style-type: none"> • Verify the proper superheat measurements. Test the operation of the expansion valve by heating and cooling the sensing bulb, checking for changes in suction pressure superheat. If no changes are seen, the power head should be replaced. If replacement of the power head does not resolve the problem, the expansion valve should be replaced. • Verify proper coil pressure drop and at least a 15–20°F difference (8 to 11°C) across return and supply air temperatures.
Suction pressure too low	<ul style="list-style-type: none"> • Loss of fluid within the expansion valve • Airflow too low across the evaporator coil • Incorrect Module set-up • Cooling setpoint too low 	<ul style="list-style-type: none"> • Replace the power head assembly to the expansion valve. • Check the evaporator coil pressure drop through the display interface. The pressure drop should match the recommended pressure drops indicated on the chart based on Module size. If the pressure drop is below recommended settings, increase the blower speed until the pressure drop matches the recommended setting. See “Calibrate airflow manually” on page 20. • Module may be configured for a smaller size Module. Check the Module size setting on the display interface, compared to Module nameplate. • Verify that the cooling setpoint is not below 68°F (20°C)

Problem	Possible Cause	Corrective Action
Humidifier inoperative	<ul style="list-style-type: none"> • Humidifier circuit breaker tripped • Water supply strainer may be clogged • Improper water supplied to humidifier • Non-essential mode input has been activated by customer interface with equipment 	<ul style="list-style-type: none"> • Check for shorted circuit. Reset circuit breaker. • Remove strainer and clean. • For proper operation, the humidifier needs to be supplied with a regular water supply. Any treated water (demineralized, softened, or ionized water) will result in improper humidifier operation. • Review the event log to see if this alarm input has been activated.
Reheat elements inoperative	<ul style="list-style-type: none"> • Circuit breaker open • Non-essential mode input has been activated by customer interface with equipment 	<ul style="list-style-type: none"> • Check for direct shorts. Reset the circuit breaker. • Review the event log to see if this alarm input has been activated.
Water carry over	<ul style="list-style-type: none"> • Insufficient air flow through evaporator coil because of icing 	<ul style="list-style-type: none"> • Check the evaporator coil pressure drop through the display interface. The pressure drop should match the recommended pressure drops indicated on the chart based on Module size. If the pressure drop is below the recommended settings, increase the blower speed until the pressure drop matches the recommended setting. See “Calibrate airflow manually” on page 20.
Airflow too low	<ul style="list-style-type: none"> • External static pressure too high • Downflow configuration does not have enough discharge space between blower discharge and floor • Evaporator coil iced up 	<ul style="list-style-type: none"> • May be able to compensate by increasing the blower speed to match recommended coil pressure drops. • Module needs to be raised to the minimum height or duct transitions added to direct air across floor. • Check the evaporator coil pressure drop through the display interface. The pressure drop should match the recommended pressure drops indicated on the chart based on Module size. If the pressure drop is below the recommended settings, increase the blower speed until the pressure drop matches the recommended setting. See “Calibrate airflow manually” on page 20. • The cooling setpoint is too low. Verify that the cooling setpoint is not below 68°F (20°C).
Airflow too high	<ul style="list-style-type: none"> • External static pressure may be too low 	<ul style="list-style-type: none"> • Check the evaporator coil pressure drop through the display interface. The pressure drop should match the recommended pressure drops indicated on the chart based on Module size. If the pressure drop is above the recommended settings, decrease the blower speed until the pressure drop matches the recommended setting. See “Calibrate airflow manually” on page 20.

Problem	Possible Cause	Corrective Action
Temperature control not tight enough	<ul style="list-style-type: none"> • Cooling/reheat settings not close enough • Reheat PID loop is not properly tuned • SCR controller not working • Interstage delay is too large • Mode of operation turned off • Non-essential mode input has been activated by customer interface with equipment • Return air temperature is reading incorrectly 	<ul style="list-style-type: none"> • Check setpoints for cooling and heating as well as deadbands. • Tune the PID loop for accurate reheat operation. • Confirm operation of SCR controller. • Reduce the interstage delay to allow quicker response to temperature changes. • Check to verify that the proper modes of operation, cooling and reheat, are activated. A Module must have specific options installed to allow all modes of operation to be active. • Review event log to see if this alarm input has been activated. • Return air is not coming from the common space and may be influenced by a close heat source or a discharge air duct affecting return air temperatures. Try to eliminate the hot or cold air stream or relocate the sensor for better room temperature readings.
Humidification control is not tight enough	<ul style="list-style-type: none"> • Check the setpoints for humidification and dehumidification • Humidifier may not be operating correctly. • Mode of operation turned off • Non-essential mode input has been activated by customer interface with equipment • Room is not properly sealed internally to maintain vapor pressure in the controlled space 	<ul style="list-style-type: none"> • Verify that the setpoints are not too far apart. Typical setpoint between humidification and dehumidification is 10%. • Verify humidification operation. Ensure that there are no humidifier alarms that could impede the humidification process. • Ensure that the proper modes of operation, humidification and dehumidification, are activated. A Module must have specific options installed to allow all modes of operation to be active. • Review the event log to see if this alarm input has been activated. • Room must have an adequate vapor barrier installed to maintain humidification and dehumidification setpoints. A clear indicator of an inadequate vapor barrier within the space is the change of controlled space humidity based on influences from the surrounding air outside the controlled space.

Problem	Possible Cause	Corrective Action
System short of capacity	<ul style="list-style-type: none"> Flash gas in liquid refrigerant line Expansion valve stuck or possibly obstructed Clogged dryer-strainer (feels cold) Ice or dirt on evaporator coil (excessively warm air from evaporator blower) 	<ul style="list-style-type: none"> Repair leak and recharge. Replace valve. Replace with new dryer-strainer. Clean coil, check for correct airflow.
Head pressure too high	<ul style="list-style-type: none"> Condenser clogged or dirty Air or other non-condensable gas in system OHE air intake blocked Overcharge of refrigerant Pump overloads tripped (glycol system) OHE fans not operating Glycol head pressure regulating valve not adjustable Glycol flow too low. Pump cavitating valve not open Glycol concentration higher than 40% 	<ul style="list-style-type: none"> Clean condenser. Evacuate system and recharge, install new dryer-strainer. Clean away debris. Purge or remove excess from high pressure side system. Reset and check cause. Check fuses and motor. Replace as needed. Check thermostat setting. Adjust as needed to obtain correct pressures. Check glycol solution level and concentration at pump. Reduce glycol to maximum 40% concentration.
Head pressure too low	<ul style="list-style-type: none"> Check water valve setting Check settings on condenser ambient sensors 	<ul style="list-style-type: none"> Correct as indicated. Set ambient sensors correctly.
Suction pressure too low	<ul style="list-style-type: none"> Flash gas in liquid refrigerant line Clogged dryer-strainer Obstructed expansion valve Head pressure too low Loss of fluid within expansion valve Lack of refrigerant Dirty air filters/clogged filter alarm 	<ul style="list-style-type: none"> Repair leak and recharge. Replace with new dryer-strainer. Repair or replace the valve. Check OHE settings. Replace the valve and feeler bulb assembly. Repair leak and recharge. Clean and replace filters.

Electrical

Problem	Possible Cause	Corrective Action
Humidifier inoperative	<ul style="list-style-type: none">• Water supply not on• Electrical connections loose• Humidifier fuse open• Relative humidity is above the setpoint	<ul style="list-style-type: none">• Turn on supply• Tighten all electrical connections• Check for shorted circuit, replace fuse• No action needed
Reheat elements inoperative	<ul style="list-style-type: none">• Overheat switch actuated• Fuse open• Thermostat set too low• Thermal fuse in heater open	<ul style="list-style-type: none">• Reset and check for operation• Check for short circuit• Adjust to required temperature• Replace thermal fuse
Water carryover	<ul style="list-style-type: none">• Insufficient air quantity over the evaporator coil• Liquid line temperature• Dirty coil• Excessive air flow• Blocked drain pan or trap	<ul style="list-style-type: none">• Check for correct airflow and clean filters.• Adjust condensing temperature, reduce subcooling• Clean the coil• Reduce CFM to specifications• Clean drain pan and trap
Module powered, but will not operate	<ul style="list-style-type: none">• Remote shut down enabled	<ul style="list-style-type: none">• Disable remote shutdown

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

APC 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 18 months from the date of Product shipment or one (1) year from the date of commissioning when APC authorized service personnel performed the commissioning of the Product. APC shall repair or replace defective parts without charge for on-site labor and travel only if APC authorized personnel have commissioned the product. If commissioning has not been by APC authorized personnel, warranty is limited to replacement of defective parts only. APC shall have no liability and no obligation to repair the installed Product if non-authorized personnel performed the commissioning and such commissioning 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 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**.

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, in APC's discretion.

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, sil-phos, silver solder, and silver solder flux.
- APC will pay for refrigerant in the event of an internal leak in the product. The associated costs will be limited and may vary from region to region.

To obtain service under Warranty, contact APC Customer Support (see back cover for telephone numbers).

Parts

- APC warrants the parts of their systems for 1 year from the date of commissioning 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 a warranty part(s). An invoice will be sent once the part(s) are shipped to the field. You have 30 days to return the part back to APC. If the parts requested to be returned have not been received 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 CET 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 requesting 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) 3 5434-2021
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.

Entire contents © 2004 American Power Conversion. All rights reserved. Reproduction in whole or in part without permission is prohibited. APC, the APC logo, and NetworkAIR are trademarks of American Power Conversion Corporation and may be registered in some jurisdictions. All other trademarks, product names, and corporate names are the property of their respective owners and are used for informational purposes only.



990-1738-001



11/2004