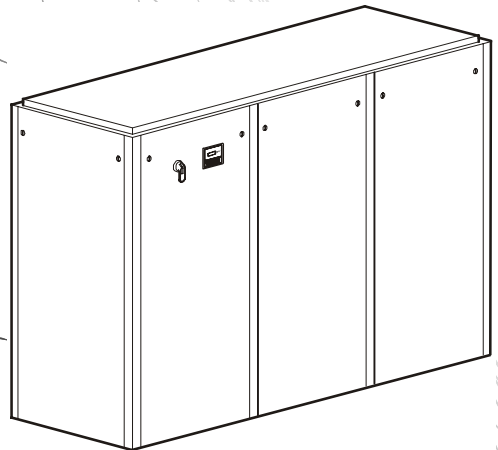


Installation

NetworkAir AFX





This manual is available in English on the enclosed CD.

Este manual está disponible en español en el CD-ROM adjunto.

O manual em Português está disponível no CD-ROM em anexo.

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General Information

Overview

Save these instructions

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

Intended users

This manual is intended for **American Power Conversion (APC) authorized personnel**. It provides component specifications and instructions for installing and commissioning the equipment.

Manual updates

Check for updates to this manual on the APC Web site, www.apc.com/support. Click on the **User Manuals** link and enter the manual part number or SKU for your equipment in the search field. Refer to the back cover of this manual for the part number.

Safety symbols that may be used in this manual



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



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



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



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



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



Tip Hazard: This equipment is easily tipped. Use extreme caution when unpacking or moving.



Note: Indicates important information.

Cross-reference symbols used in this manual



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



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

Safety



Note: All work should be performed by APC authorized personnel only.

Follow all local and national codes when installing this system.

Only a licensed plumber may connect water lines.

Only a licensed HVAC contractor may connect refrigeration lines.

For indoor use only



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

Check for foreign objects before closing the doors and starting the equipment.



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

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

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



Electrical Hazard: Only a licensed electrician may connect the equipment to utility power.

Do not wear jewelry when working near energized components.

Inspecting the Equipment

Your equipment has been tested and inspected for quality assurance prior to shipment from APC. To ensure that the equipment has not been damaged during transit, carefully inspect both the exterior and interior of the equipment immediately upon receipt.

Verify that all parts ordered were received as specified. See “Model Identification” on page 5.

Filing a claim

If damage is identified on receipt of the equipment, note the damage on the bill of lading and file a damage claim with the shipping company. Contact APC for information on filing a claim with the shipping company. The shipping claim must be filed at the receiving end of the delivery.



Note: In case of shipping damage, do not operate the equipment. Keep all packaging for inspection by the shipper and call APC at one of the numbers listed on the back cover of this manual.

Storing the Equipment Before Installation



Caution: Leaving the equipment uncovered and exposed to the elements can cause damage and will void the factory warranty.

Moving the Equipment

Rigging

The equipment is manufactured with a formed steel frame for maximum strength and integrity. However, as with all electrical/mechanical devices, take care to properly rig the equipment. If you uncrate the equipment before moving it into place, remove the panels to prevent damage during handling.

When using a forklift to move the equipment, use the shipping pallet to protect the bottom of the unit. When using chains, cable, or rope to lift the unit, use spreader bars to prevent damage to the finished panels.

Moving the equipment through door openings

Depending upon your installation, you may need to temporarily modify the equipment to fit through smaller door openings.

If necessary, decrease the width of the equipment by removing the front door panels and rear door panels.



Tip Hazard: The equipment has a high center-of-gravity. Use extreme caution to prevent tipping when unpacking or moving the equipment to its final location.



Warning: When using a forklift to move the equipment, make sure to lift only from the bottom. Do not use a forklift if the equipment has been removed from its pallet.



Heavy: Do not attempt to move the equipment without assistance. Moving this requires two or more people.

Select the appropriate tools for moving the equipment. Each site will have different needs and considerations.

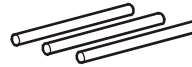
Pallet jack

Furniture dollies (2)

Forklift

Roller bars

Wheeled lever



Cooling Configurations

The equipment is available in air, water and glycol-cooled configurations.

Air-cooled

Air-cooled equipment is shipped with a holding charge (which will need to be removed prior to evacuation) and requires on-site installed refrigerant piping. Each installation requires an engineered piping solution.

Water-cooled

Water-cooled equipment is completely charged and factory-tested as sealed systems. Cooling towers are used as a source of heat rejection and can serve multiple equipment. Towers using outdoor air require water treatment. Water piping to and from the equipment is installed on-site.

Glycol-cooled

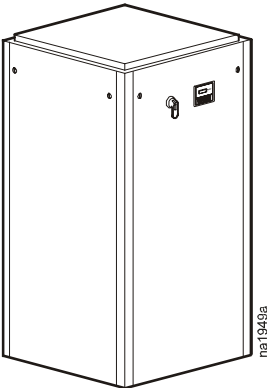
Glycol-cooled equipment is completely charged and factory-tested as sealed systems.

Model Identification

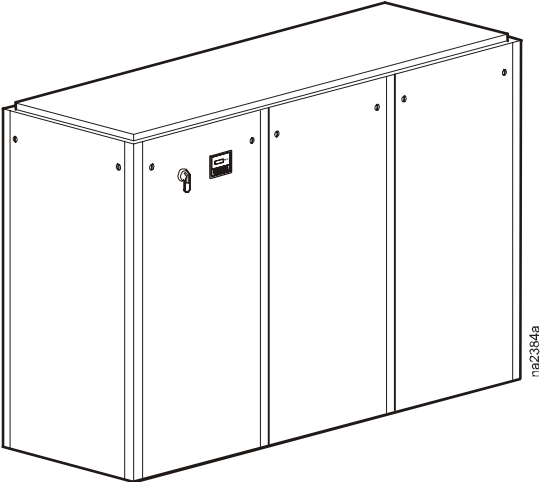
The model number can be found on the outside of the shipping carton and on the ratings label located on the lid of the electrical box.

Component Identification

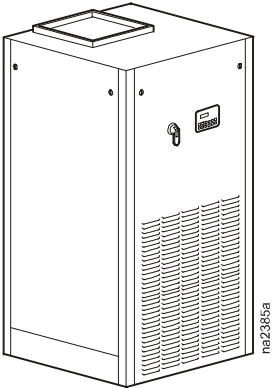
Downflow NetworkAIR AFX018 — exterior



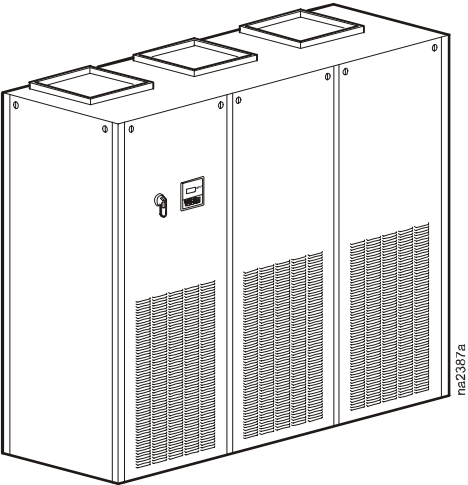
Downflow NetworkAIR AFX065 — exterior



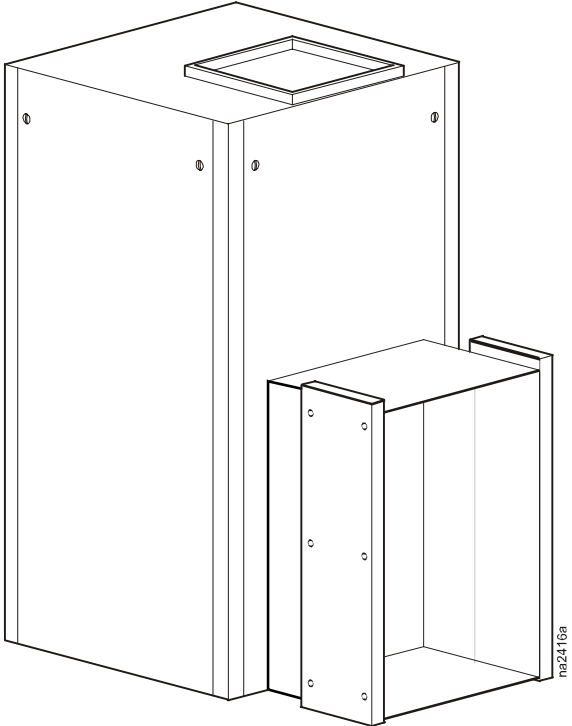
Upflow NetworkAIR AFX018 (front return) — exterior



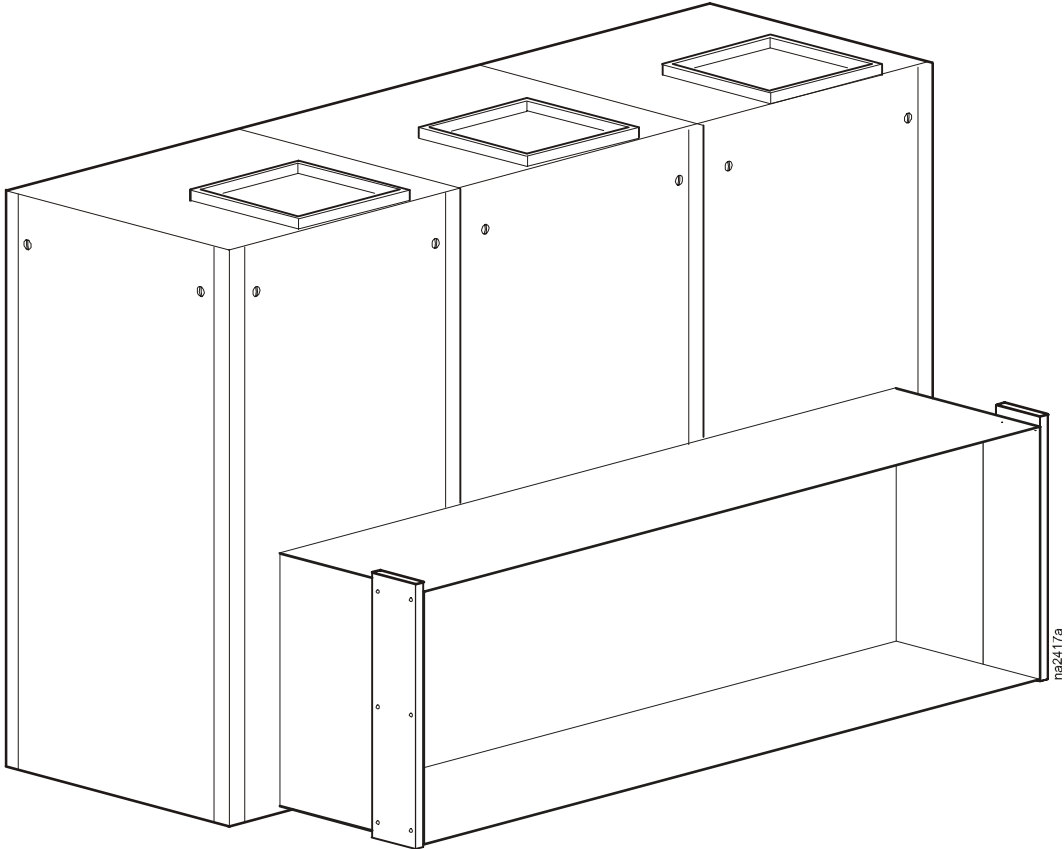
Upflow NetworkAIR AFX065 (front return) — exterior



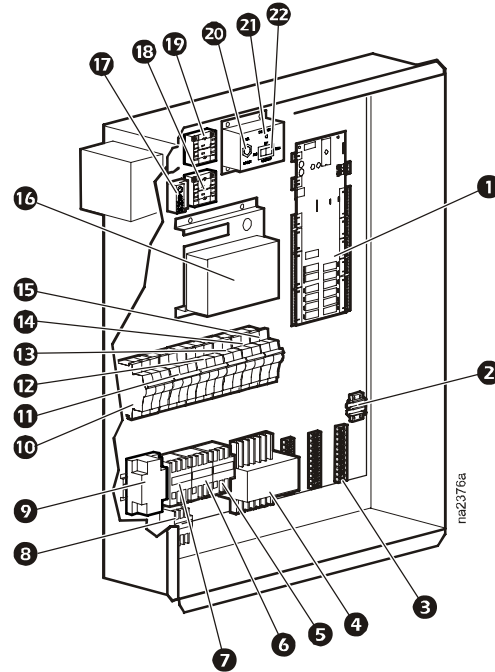
Upflow NetworkAIR AFX018 (rear return) — exterior



Upflow NetworkAIR AFX065 (rear return) — exterior



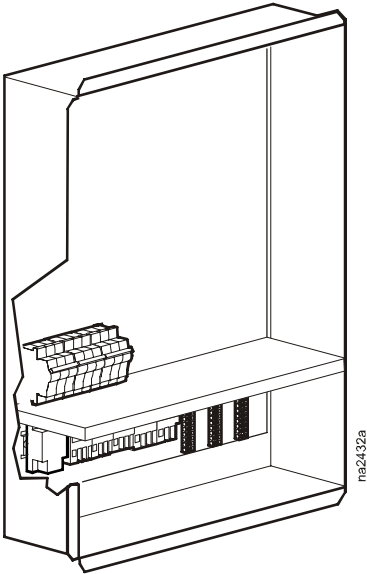
Main electrical box



Item	Description
------	-------------

- | | |
|----|---|
| 1 | Microprocessor DG 5.0 |
| 2 | Control distribution terminal block |
| 3 | Feed through terminal block |
| 4 | Control transformer |
| 5 | Contactors – humidifier |
| 6 | Contactors – module |
| 7 | Blower motor starter – module #1 |
| 8 | Fan motor overload |
| 9 | Contactors – compressor |
| 10 | Circuit breaker – compressor #1 (CB2) |
| 11 | Circuit breaker – blower motor (CB1) |
| 12 | Circuit breaker – heat, module #1 (CB4) |
| 13 | Circuit breaker – humidifier (CB6) |
| 14 | Circuit breaker – transformer (CB5) |
| 15 | Circuit breaker – condensate pump (CB3) |
| 16 | Humidifier PC board |
| 17 | Ground lug |
| 18 | Remote shutdown relay |
| 19 | Change cylinder alarm relay #1 |
| 20 | COOL override switch #1 |
| 21 | Change cylinder light |
| 22 | Humidifier On/Off/Auto switch |

Slave electrical box



Item Description

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13

Room preparation

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

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

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

Equipment location. Equipment location is important for efficient and uniform environmental control in your data center. The air conditioners should be located as close to the largest heat load as possible. To ensure even air distribution in rooms having a high aspect ratio, mount equipment along the longest walls. Erratic control or mechanical failure can and will result if the equipment does not obtain proper air volume and distribution due to improper installation.

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

Incoming power supply requirements



Electrical Hazard: The equipment requires three-phase electrical

Electrical service must conform to national and local electrical codes and regulations. The equipment must be grounded.

Supporting the equipment

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



Note: Consult your raised floor manufacturer for weight capacities if installing directly on the raised floor.

Floorstand. When using a floorstand with raised floors, remove or cut the flooring to fit the floorstand dimensions. If the equipment is close to a wall at the back, ensure any gap is sealed with flooring or another type of partition. Place the floorstand in the correct location with the pedestals going into the pedestal socket on the floorstand and place the cork-rubber vibration pad under the pedestal.

Once you have positioned the floorstand and pedestal arrangement, put a small amount of adhesive between the pedestal and the pad, and between the pad and subfloor to keep the equipment from moving. Level the floor stand assembly to within 1/4 in (6.4 mm) using the adjustment nuts on the threaded pedestal legs.

Seal all the way around the upper perimeter of the floor stand with a flexible airtight gasket or sealer to prevent air leakage. Floorstands are available from APC with a 1.5 in (38 mm) adjustment range to meet 95% of the installation requirements without any modification to the floorstand assembly. If necessary, the threaded rod may be cut to meet specific installation requirements.



Note: Put the leveling nuts on the rod before cutting in case the thread is burred or damaged when cut.

Pedestal mounts. The equipment is supplied with pedestal sockets so that a floorstand is not necessary for system installation. When using pedestal mounts on a raised floor, cut the floor to fit the equipment frame perimeter. Level the unit to within 1/4 in (6.4 mm) using the adjustable nuts on the pedestal legs.

Seal the gap between the equipment and the raised floor with a flexible air tight gasket. Use a small amount of adhesive between the pedestal, pad and subfloor to preclude pedestal movement.

Air distribution

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

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

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

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

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



Note: All equipment is designed for a maximum of 0.5 inches (125 Pa) of external static pressure.

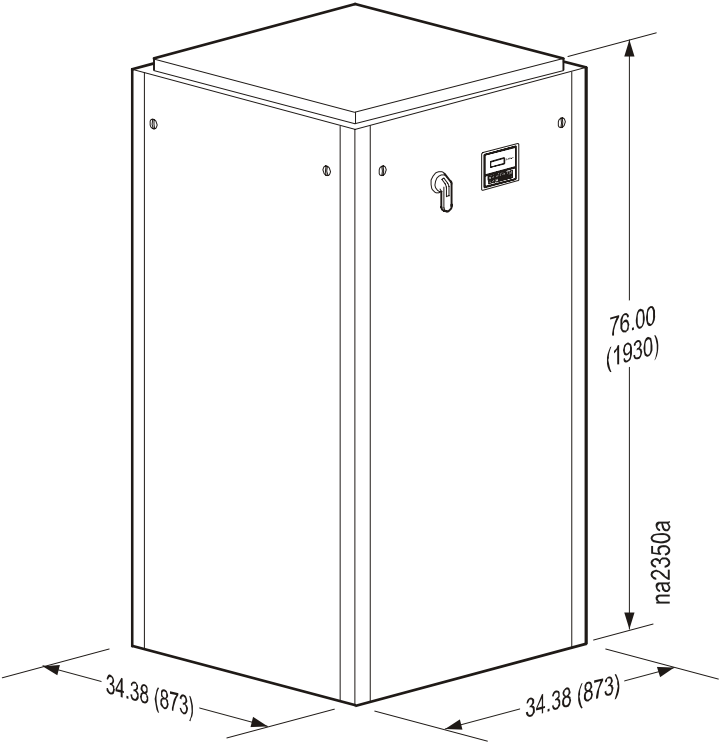
Weights and Dimensions

Weights

Model	Unpacked Weight
AFX018	925 lbs (420 kg)
AFX065	2,200 lbs. (998 kg)

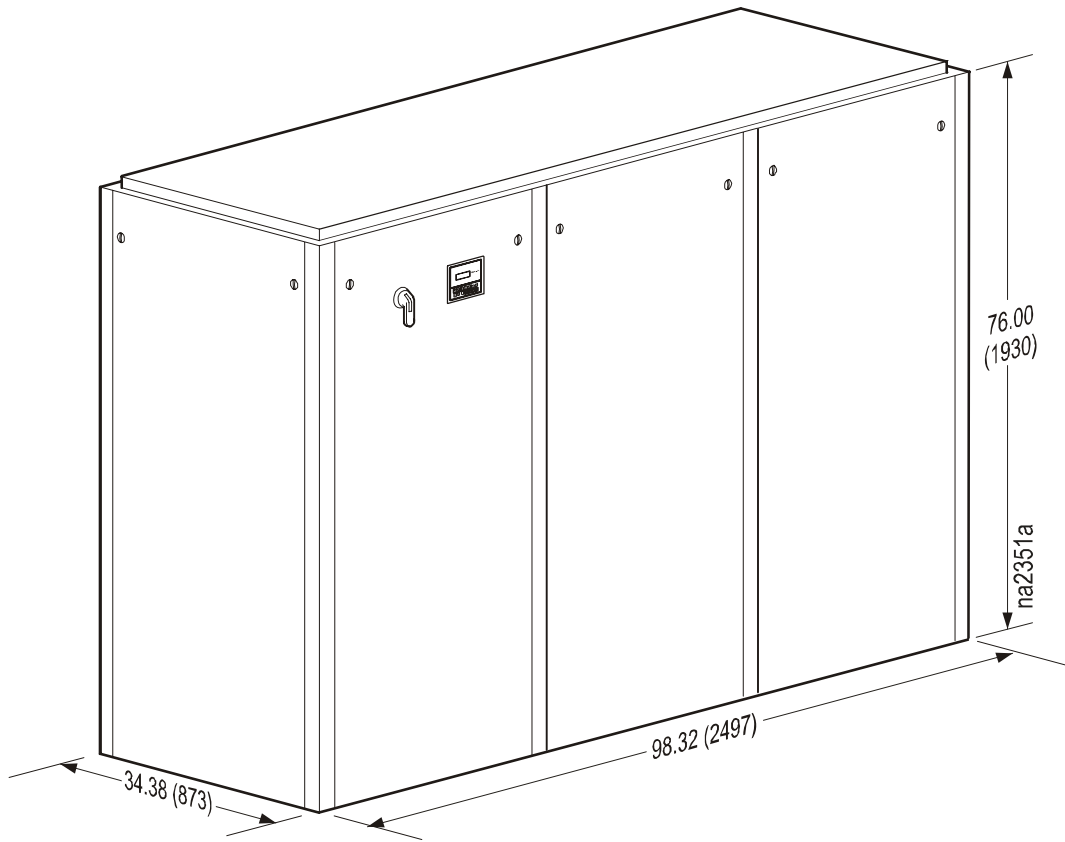
Dimensions

Downflow - AFX018



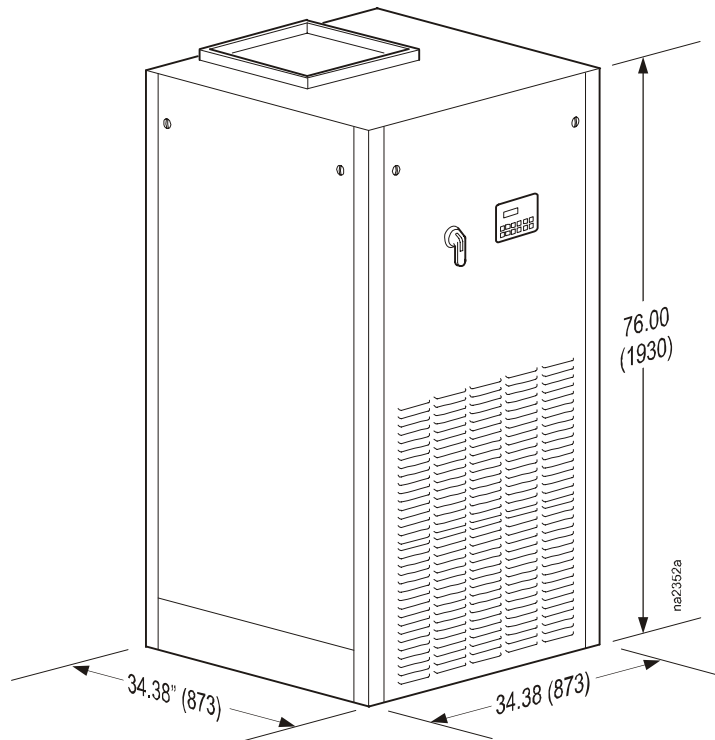
Dimensions are shown in inches (millimeters)

Downflow - AFX065



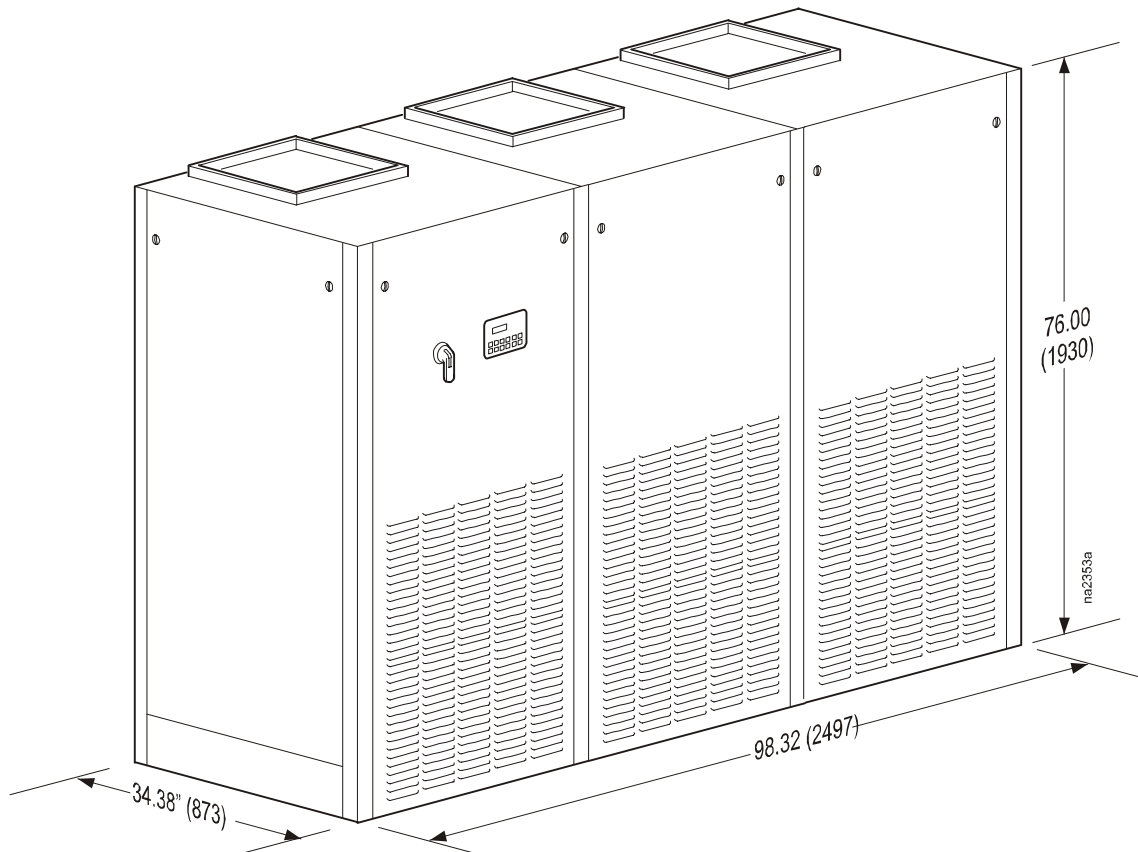
Dimensions are shown in inches (millimeters)

Upflow front return - AFX018



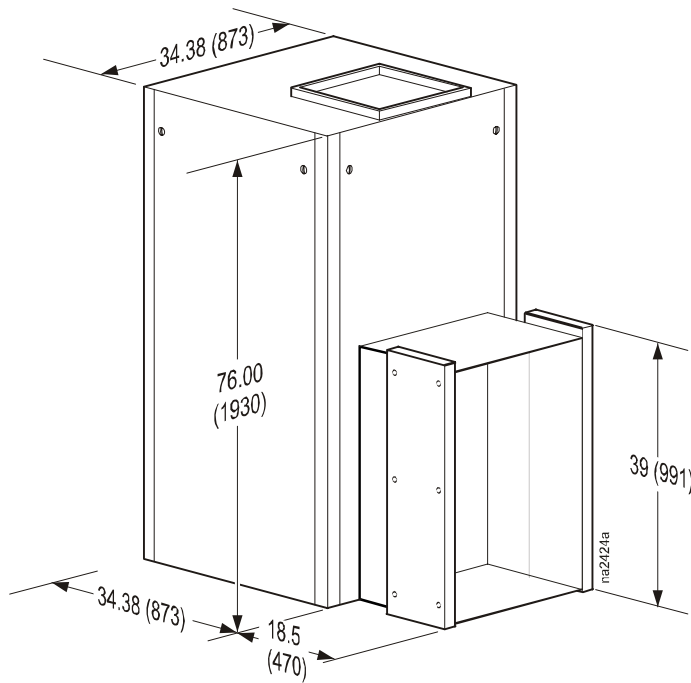
Dimensions are shown in inches (millimeters)

Upflow front return- AFX065



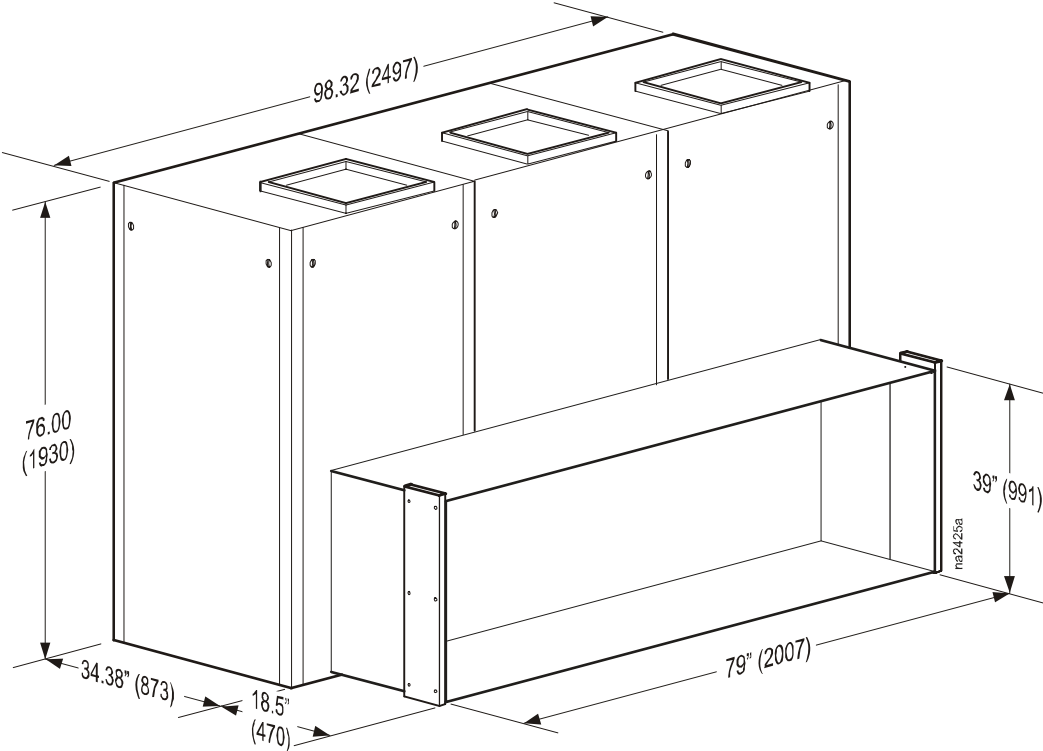
Dimensions are shown in inches (millimeters)

Upflow rear return - AFX018



Dimensions are shown in inches (millimeters)

Upflow rear return- AFX065



Dimensions are shown in inches (millimeters)

Installation

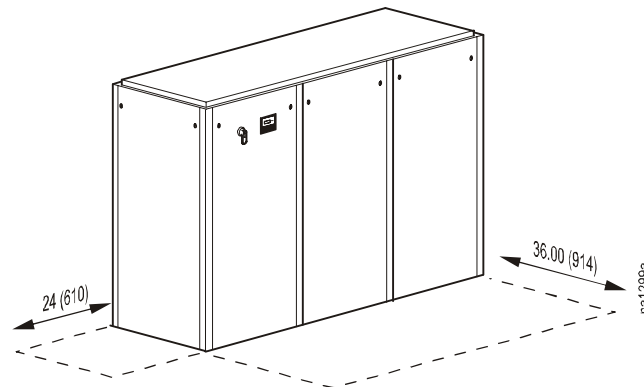
Positioning the Equipment

Service access

An area of 36 inches (914 mm) of clear floor space in front of the equipment and 24 inches (610 mm) on each side is required for service.

Ensure a minimum 24 inches (610 mm) clearance exists from any adjacent wall (AFX065 downflow shown).

Ensure an adequate supply of air is available to rear return equipment.



Stabilizing the Equipment



For instructions on how to install the floorstand and plenum see the instructions supplied with the equipment.

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

Mechanical Connections

Plenums and ducting

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

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

Outdoor heat exchangers (OHE)

Locate the OHE in a high security area.

Clearance. When selecting a location, the most important consideration is to provide adequate clearance between the OHE and any other obstruction (wall, fence, or other equipment). A sufficient amount of ambient (not heated by other units) supply air must be able to reach the OHE. The heated exhaust air must be able to exit the OHE without interference that may cause back pressure, leading to poor performance and possible equipment failure.

The minimum clearance is a distance equal to the width of the condenser from any adjacent wall or other obstruction. If multiple OHEs are installed side by side, the minimum clearance must be the width of the largest OHE. Ensure a minimum of four feet (1.2 m) clearance between OHEs installed end-to-end. If possible, always provide more than the minimum allowable clearance. Clear the area of any paper or other debris that may be drawn into the coil.

Be aware of prevailing air movements that may cause short circuiting of entering and leaving condenser air.

Noise and vibration. Give consideration to noise and vibration transmitted from the OHE to spaces below its location. Provided clearance requirements are met, locate the unit over corridors, rest rooms, or other areas where noise is less of a factor.

Mount the OHE on a level surface having sufficient strength to support its weight when fully charged. Use the mounting holes on the heat exchanger to prevent it from shifting during operation.

Before operation, ensure that all OHEs satisfy the following requirements:

- Incoming voltages match the nameplate listed on the OHE.
- All setscrews are secure.
- Fan blades turn freely, do not wobble, and are not distorted.
- Fan blades rotate in the proper direction.

Provide a main power disconnect to isolate the OHE during routine service or in an emergency.



Refer to the heat exchanger manufacturer's installation, operation, and maintenance manuals for proper installation procedures.

Flooded receiver

1. Attach the flooded receiver to the side of the heat exchanger.



Caution: Be careful not to puncture the coil.

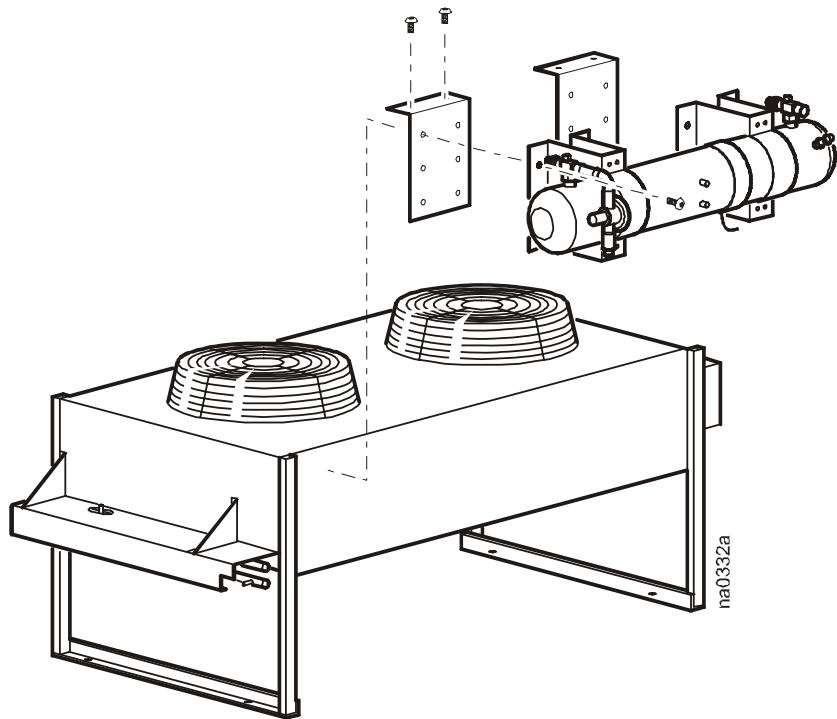


Refer to the OHE manual for guidance in placing the receiver.

2. Position the mounting brackets on the side of the OHE. Mount each bracket using two screws for each bracket, and using the top holes in each bracket for placement.

3. Using the holes provided on the vertical side of the mounting brackets as a template, drill pilot holes for each remaining mounting hole (six per mounting bracket).

4. Attach the flooded receiver to the side of the OHE, aligning the twelve holes of the flooded receiver mounts to the corresponding holes in the mounting brackets, using twelve self-tapping screws (provided).



Pump packages

Single pump package. Provide sufficient valves and unions to isolate the dry cooler and pump package during routine service or in the event of an emergency. Pipes should be welded wherever possible to minimize leak possibility.

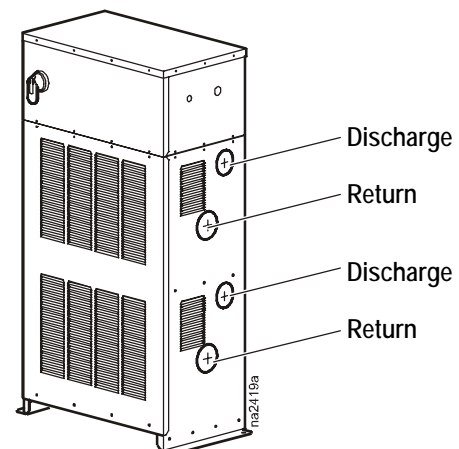
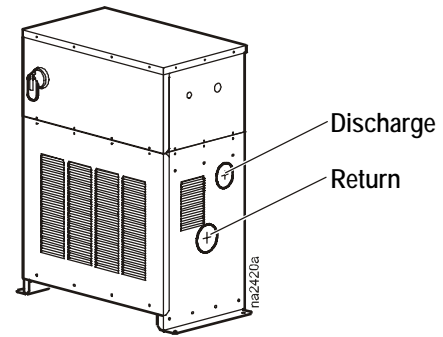
Pipe and wire the dry cooler in accordance with local and national codes. A wiring diagram is attached to the inside of each control panel cover. The control enclosures are weather-protected and should be mounted close to the header end of the dry cooler. All thermostats should be checked for the proper setpoint per the wiring diagram. Any remote bulb thermostats should be mounted at this time. The pump package is weather-protected and has been factory wired with branch fusing and pump motor overloads. Consult the nameplate for electrical information on the pump package for disconnect sizing. Your pump size may have been increased or decreased from the standard pump package due to pressure drop requirements.

Mount the pump package as close as possible to the drycooler. The glycol solution should flow from the drycooler to the pump package.

Mount the expansion tank with airtrol fitting between the drycooler and pump package at the highest point in the piping system, and provide a fill hose bib to facilitate filling the system.

Installation of an air separator will enhance the ability to remove the air during start-up.

Dual-pump packages. Field-supplied check valves are required on the discharge of each pump. Use isolation valves in the piping design to facilitate the isolation of each pump in the case of pump failure and pump replacement while the condenser loop is in operation. All temperature control devices for the fluid-cooler fans should be located on the fluid-out header of the fluid-cooler (typically on a draw-through fluid-cooler, the bottom header, or the header located at the air-intake side of the fluid-cooler where the coolest air is pulled in). These temperature-sensing bulbs must be insulated properly to prevent temperature influences from ambient or solar conditions. Dual pump packages will have a factory-supplied, field-installed flow switch used to activate the auto changeover function on dual pump packages. This flow switch must sense flow on the condenser loop supply coming from the pump discharge.



Expansion tank

Mount the expansion tank at the highest point in the piping system. Provide a faucet for filling the system.



When plumbing the expansion tank, see “Room preparation” on page 10

Refrigeration piping

Discharge lines are sized such that velocity in the line is between 1000 ft/m (5 m/s) and 3000 ft/min (15 m/s). The refrigerant velocity must be high enough to keep oil entrained in the flow. If the refrigerant velocity is too high, both the noise level and pressure drop will increase. Acceptable pressure drops in discharge lines are up to 10 psi (70 kPa).



Note: A relief valve is required in the discharge line outside near the condenser.

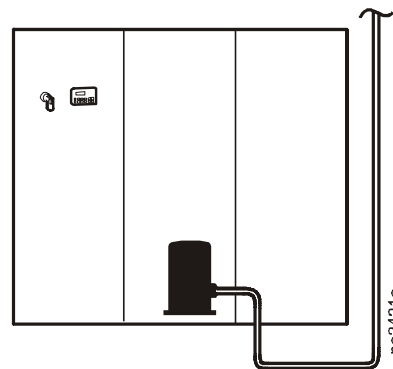
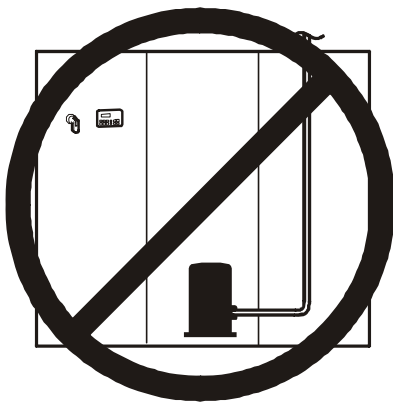
All refrigerant lines should be as short and direct as possible. Horizontal discharge lines must be pitched downward, minimum 1/2 in per 10 ft (42 mm per meter) in the direction of flow to aid in oil return. Vertical discharge lines should be trapped approximately every 20 ft (6 m) to ensure proper oil return. Traps are normally not necessary at the base of discharge lines; however, loop the line to the floor before running it vertically to prevent the drainage of oil back to the compressor during shutdown periods.

Insulation. Insulate discharge lines to protect personnel and to minimize condensation of refrigerant during off cycles. It is not necessary to insulate liquid lines (unless you are using a flooded condenser package) where low ambient temperatures could increase subcooling of liquid to the point that condensation could occur.

Air-cooled equipment. The equipment must be connected to a condenser—either a remote outdoor condenser or indoor centrifugal condenser. Systems with remote outdoor or indoor centrifugal condensers must have discharge and liquid lines from the indoor equipment to the condenser. Run all refrigerant lines in accordance with applicable industry guidelines.

Calculate an equivalent length based on the actual linear length of the run, including valves and fittings. All fittings should be long-radius to minimize pressure drop.

Incorrect and correct routing of refrigeration lines.



Length of common valves and fittings

Water pipe equivalent lengths for fittings and valves standards.

Size of Pipe in Inches	Type of Fitting or Valve - Equivalent Length of Pipe in Feet				
	Gate Valve	Std. Elbow 90°	Reduced Coupling	Side Outlet "T"	Angle Valve
1/2	0.7	1.6	1.6	3.0	7.0
3/4	0.9	2.0	2.0	4.0	9.0
1	1.0	2.6	2.6	5.0	12.0
1-1/4	1.5	3.3	3.3	7.0	15.0
1-1/2	1.8	4.0	4.0	8.0	18.0
2	2.3	5.0	5.0	10.0	24.0

ASHRAE equivalent lengths for fittings and valves standards (6ft/s water).

Size of Pipe in Inches	Type of Fitting or Valve - Equivalent Length of Pipe in Feet						
	Std Elbow 90°	Long Turn Elbow 90°	Reduced Coupling	Gate Valve	Globe Valve	Tee Branch [†]	Tee Line [†]
1/2	1.7	0.9	0.7	1.2	28.9	4.1	1.5
3/4	2.3	1.2	0.9	1.6	39.1	5.6	2.4
1	3.0	1.5	1.2	2.1	51.0	6.7	3.4
1-1/4	4.0	2.0	1.6	2.8	68.0	8.2	4.4
1-1/2	4.7	2.4	1.9	3.3	79.9	9.6	5.4
2	6.0	3.0	2.4	4.2	102.0	11.9	7.7
2-1/2	7.2	3.6	2.9	5.0	122.4	14.5	10.1
3	8.9	4.5	3.6	6.2	151.3	16.7	12.6
3-1/2	10.3	5.2	4.1	7.2	175.1	20.2	15.2
4	11.4	5.7	4.6	8.0	193.8	21.8	17.9

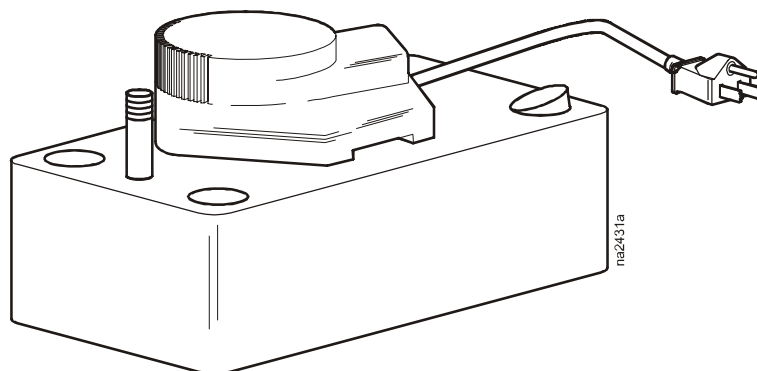
[†]Screwed pipe fitting

Water/glycol

Use care when identifying the inlets and outlets of the glycol/water-cooled components. Install isolation valves and circuit flow switches as necessary to facilitate proper servicing and flow control. Refer to the piping layout drawings.

Condensate pump

The pump is factory-wired and piped internally to the condensate pan and humidifier discharge. The pump has a maximum lift of 15 ft (4.6 m), and has its own internal check valve to prevent short-cycling. The pump also uses an onboard condensate high level float switch, which is wired into the alarm input for local and remote alarm capabilities.



Condensate pump drain connection. Attach the drain line to the 3/8 in barbed condensate drain tube and secure with a hose clamp. Route the drain line through an opening in the bottom of the equipment to an open drain.



Note: Comply with local and national codes when installing the condensate drain line to an open drain.

Piping connections

Air-cooled. When piping air-cooled systems, be sure to use only clean refrigerant grade (Type L) pipe and follow standard procedures for pipe size selection. The maximum recommended distance between the evaporator and condenser is 200 equivalent ft (61 m). For any runs beyond this distance, contact the factory for assistance. Vertical runs (hot gas) require a trap every 20 ft (6 m) of rise.



Note: When brazing copper field-installed refrigeration lines, use a nitrogen purge to minimize accumulation or scale during the brazing process.

The air-cooled system has been dehydrated at the factory and is shipped with a holding charge of nitrogen. Test refrigerant connections for leaks before charging the system with refrigerant.

1. Pressurize the complete system with a trace amount of refrigerant.
2. Then pressurize the system to 250 psi (1700 kPa) with dry nitrogen.
3. Pressurize the system again to 250 psi (1700 kPa) to double-check all joints.
4. After performing the leak check, use a vacuum pump to evacuate the total system.
5. Pull a vacuum on the total system of 1,000 microns and hold it for four hours.
6. Break the vacuum with dry refrigerant. At this point, the system can be fully charged.

RECOMMENDED DISCHARGE LINE SIZES - R-22

Capacity BTU/hr	Equivalent Length, Ft.			
	50	100	150	200
18,000	5/8	5/8	5/8	7/8
24,000	5/8	7/8	7/8	7/8
36,000	7/8	7/8	7/8	7/8
60,000	7/8	1 1/8	1 1/8	1 1/8
18T	1 1/8	1 1/8	1 3/8	1 3/8

Recommended sizes are applicable with evaporating temperature from -40° F to 45° F (-40° C to 7.2° C) and condensing temperatures from 80° F to 130° F (27° C to 54° C).



Note: Steel tubes and fittings must not be connected directly to copper tubes or fittings. Insert a minimum of 3 ft (1 m) plastic tube between copper and steel tubes to avoid corrosion damage to the copper.

RECOMMENDED LIQUID LINE SIZES - R-22

Capacity BTU/hr	Condenser to Evaporator Equivalent Length, Ft.			
	50	100	150	200
18,000	3/8	3/8	1/2	1/2
24,000	3/8	1/2	1/2	1/2
36,000	1/2	1/2	1/2	1/2
60,000	1/2	5/8	5/8	5/8
18T	5/8	7/8	7/8	7/8

Recommended sizes are applicable with evaporating temperature from -40° F to 45° F (-40° C to 7.2° C) and condensing temperatures from 80° F to 130° F (27° C to 54° C).

Piping Connection Sizes

MODEL	AFX18	AFX65
Air Cooled Connections		
Liquid Line	1/2" O.D.	5/8" O.D.
Charge Line	5/8" O.D.	1 1/8" O.D.
Condensate Drain	7/8" I.D.	7/8" O.D.
Humidifier Line	1/4" O.D.	1/4" O.D.
Hot Water (in)	5/8" O.D.	5/8" O.D.
Hot Water (out)	5/8" O.D.	5/8" O.D.
Steam Reheat (in)	5/8" O.D.	5/8" O.D.
Steam Reheat (out)	5/8" O.D.	5/8" O.D.
Water Cooled Connections		
Water (in)	7/8" O.D.	1 3/8" O.D.
Water (out)	7/8" O.D.	1 3/8" O.D.
Condensate Drain	7/8" I.D.	7/8" O.D.
Humidifier Line	1/4" O.D.	1/4" O.D.
Hot Water (in)	5/8" O.D.	5/8" O.D.
Hot Water (out)	5/8" O.D.	5/8" O.D.
Steam Reheat (in)	5/8" O.D.	5/8" O.D.
Steam Reheat (out)	5/8" O.D.	5/8" O.D.
Glycol Cooled Connections		
Glycol (in)	7/8" O.D.	1 3/8" O.D.
Glycol (out)	7/8" O.D.	1 3/8" O.D.
Condensate Drain	7/8" I.D.	7/8" O.D.
Humidifier Line	1/4" O.D.	1/4" O.D.
Hot Water (in)	5/8" O.D.	5/8" O.D.
Hot Water (out)	5/8" O.D.	5/8" O.D.
Steam Reheat (in)	5/8" O.D.	5/8" O.D.

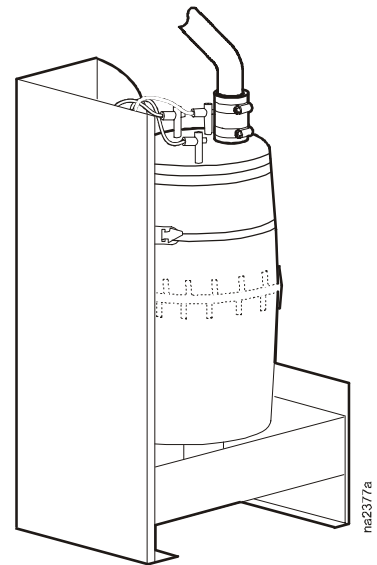
Piping Connection Sizes

MODEL	AFX18	AFX65
Steam Reheat (out)	5/8" O.D.	5/8" O.D.
Evaporator Section		
Suction Line	7/8" O.D.	1 1/8" O.D.
Liquid Line	1/2" O.D.	5/8" O.D.
Condensate Drain	7/8" I.D.	7/8" O.D.
Humidifier Line	1/4" O.D.	1/4" O.D.
Hot Water (in)	5/8" O.D.	5/8" O.D.
Hot Water (out)	5/8" O.D.	5/8" O.D.
Steam Reheat (in)	5/8" O.D.	5/8" O.D.
Steam Reheat (out)	5/8" O.D.	5/8" O.D.

Humidifier. The humidifier inlet connection is in the bottom mechanical section. A 1/4 in compression connection is supplied with the equipment.

Water supply to humidifier connection

1. Read and understand the following points prior to making water connections:
 - a. The humidifier fill valve orifices are sized for supply water pressure from 30 to 85 psig (207 to 586 kPa).
 - b. For applications above 85 psig (586 kPa), install a pressure reducing valve in the water feed line to the unit.
 - c. With extremely dirty or muddy water sources, install proper filtration on the entering water line.
 - d. **DO NOT** use softened water with the humidifier because softened water is too conductive.
 - e. **DO NOT** use completely demineralized water with the humidifier. Minerals allow the electrode principle to work.
 - f. **DO NOT** use a hot water source because it will cause deposits to eventually block the fill valve orifice.
 - g. Precondition water supplies with high conductivity (above 700 microhms) for proper humidifier operation and longevity.
2. Connect the provided 1/4 in O.D. soft copper tubing to the connection in the side of the humidifier.



Note: Each unit is fitted with a solenoid fill valve located on the base drain pan. Flow orifices in the valve are designed for water pressure between 30 and 85 psig (207 to 586 kPa), and are protected by a built-in strainer. For inlet water pressures outside this range, contact APC.



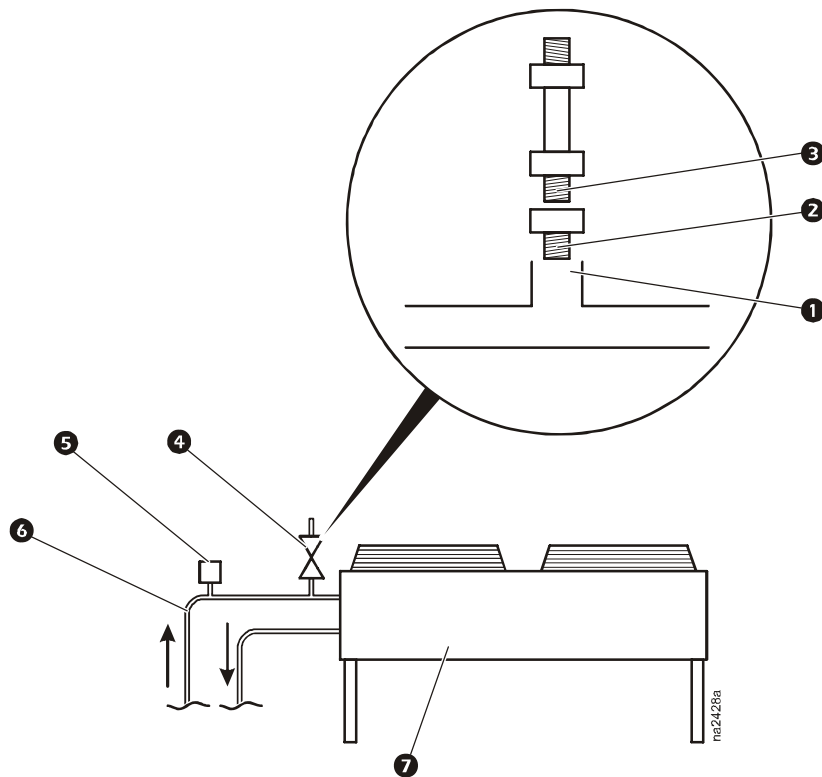
Note: Always install an isolation valve in the water feed line to facilitate fill valve servicing.

Pressure relief valve. All water and glycol cooled equipment is supplied with pressure relief valves on the receiver. Pipe these valves to the external ambient, particularly if the data center is equipped with a HALON fire suppression system.



Note: Use only type L tubing for refrigeration and air conditioning lines. Do not use soft solder when brazing type L tubing.

Install the factory-supplied pressure relief valve on the refrigerant discharge line (air cooled only). Use a brass female adapter to avoid leaks, and silver solder in place. Wrap the pressure relief valve while soldering to avoid damage to the valve.



Item	Description
1	Copper tee fitting
2	Brass bushing
3	Thread sealer
4	Pressure relief valve
5	Charging/service valve (field-installed)
6	Discharge line
7	OHE

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

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

Electrical Connections

The electrical connections required in the field are:

- Main power
- Controls
- OHE
- Communication



Refer to the electrical schematic supplied with the equipment for all electrical connections.

Make all electrical connections in accordance with national and local codes. Refer to the nameplate for voltage and current requirements. A power disconnect is required to isolate all equipment for maintenance and service.



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



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

Main power connections



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

The equipment uses three phase power for operation. Bring the service cable through the 3/4 in bulkhead hole near the electric box and connect it to the power distribution block provided on the left side of the electric box. Connect all wiring in accordance with local and national electric codes.

Grounding . A ground lug is located next to the high voltage connection. It must be used.



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

Refer to the equipment nameplate for voltage and current requirements.

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

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



Note: Wire all input and output connections as Class 2 circuits.

Control connections

Install all refrigeration control wiring in accordance with local and national electrical codes.

Depending on equipment configuration, additional control connections may be required for traditional equipment-monitoring software.

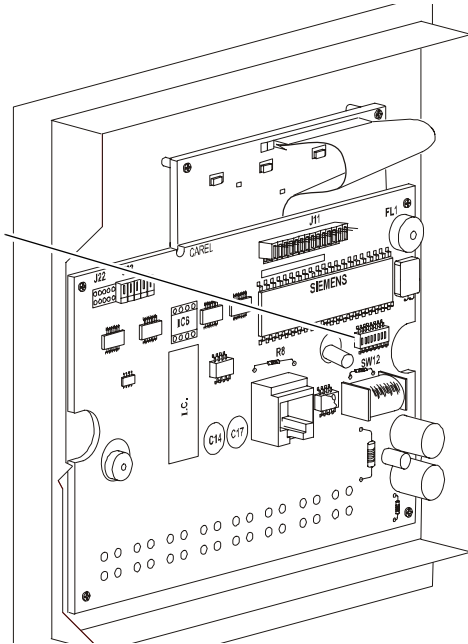
The control connections consist of:

- OHE

DIP switch configuration

Set the DIP switches on all address boards and displays. DIP switches on the address board are located at J16 near the center of the interface board. Display DIP switches are next to the integrated circuit on the display board.

Display DIP switches



Caution: Ensure jumpers J8 and J9 on the interface board are between pins 3 and 2. Otherwise, the equipment will not operate.

Interface Board Address DIP Switch Settings

1	2	3	4	5	6	ADDRESS	DEVICE
ON	OFF	OFF	OFF	OFF	OFF	1	Unit 1 interface board
OFF	ON	OFF	OFF	OFF	OFF	2	Unit 2 interface board
ON	ON	OFF	OFF	OFF	OFF	3	Unit 3 interface board
OFF	OFF	ON	OFF	OFF	OFF	4	Unit 4 interface board
ON	OFF	ON	OFF	OFF	OFF	5	Unit 5 interface board
OFF	ON	ON	OFF	OFF	OFF	6	Unit 6 interface board

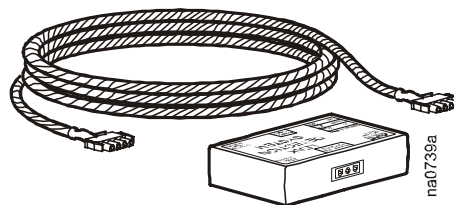
Display Address DIP Switch Settings

1	2	3	4	5	6	7	8	ADDRESS	DEVICE
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	17	Unit 1 display
OFF	ON	OFF	OFF	ON	OFF	OFF	OFF	18	Unit 2 display
ON	ON	OFF	OFF	ON	OFF	OFF	OFF	19	Unit 3 display
OFF	OFF	ON	OFF	ON	OFF	OFF	OFF	20	Unit 4 display
ON	OFF	ON	OFF	ON	OFF	OFF	OFF	21	Unit 5 display
OFF	ON	ON	OFF	ON	OFF	OFF	OFF	22	Unit 6 display

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



See the installation manual supplied with the kit, for installation and set-up.



Commissioning

After the equipment is installed, verify that all components are working properly and that it is ready to begin operation. To commission the system, the following inspections need to be completed:

- Initial
- Electrical
- Mechanical/refrigeration
 - Air-cooled
 - Water/glycol-cooled

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

- Functional test
- Charging

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

- Start-up
- Final



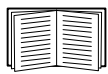
Warning: The equipment must be properly de-energized and locked-out prior to performing any service.

Review the MSDS sheets (R-22) for safe handling of the refrigerant.

The equipment operates under pressure (40-425 psi; 276-2930 kPa). Take proper safety precautions when connecting gauges or servicing the refrigerant/condenser loop or chilled water piping.

Initial inspection

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



To perform the inspection, see “Initial Inspection Checklist” on page 37.



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



Caution: A vapor barrier minimizes moisture infiltration. Without a vapor barrier, your equipment will have difficulty maintaining the proper humidity level in the room.

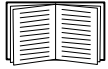
Do not introduce unconditioned outside air into the space.



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

Electrical inspection

The electrical inspection ensures that all electrical connections are secure and correct and that the equipment is properly grounded.



To perform the inspection, see “Electrical Inspection Checklist” on page 38.



Warning: All electrical wiring must comply with national and local codes.

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

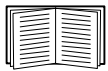
Three-phase electrical service is required.

Mechanical/refrigeration inspection

There are three distinct mechanical/refrigeration inspections corresponding to the different heat rejection methods:

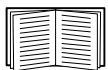
- Air-cooled
- Water/Glycol-cooled

Perform the appropriate inspection for your configuration.



See “Mechanical Inspection: Checklist” on page 39.

Air-cooled. The air-cooled mechanical inspection ensures that air-cooled equipment is ready for start-up and charging. The inspection ensures that field piping is properly installed to promote oil return to the compressors.



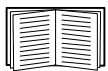
To perform the inspection, see “Mechanical Inspection: Checklist” on page 39.



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

Failure to properly install piping and traps may result in improper equipment operation and poor oil return through the refrigerant piping system.

Water/glycol equipment. The water/glycol-cooled mechanical inspection ensures that field piping is properly installed, including: sensor bulb installation, sensor bulb placement, and proper piping sizes. The system is checked for leaks, air in the system, and proper installation of the pump package and expansion tank.



To perform the inspection, see “Mechanical Inspection: Checklist” on page 39.



Note: Equipment with a dry cooler must have a means of allowing air to escape the system. Automatic bleed vents are preferred.

System charging

The equipment and integrally-mounted air-cooled systems are factory charged with refrigerant. All other direct expansion systems must have the piping evacuated and the system charged.

Leak test all refrigerant connections before charging with refrigerant:

1. Pressure the complete system to 400 psig (2758 kPa) with refrigerant and dry nitrogen.
2. Use an electronic leak detector to carefully check each joint.
3. Repair leaks and pressurize again to 400 psig to double check all joints.

After performing the leak check:

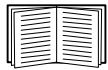
1. Use a vacuum pump to evacuate the total system (the equipment, condenser and interconnecting piping) after the condenser has been installed in the system.
2. Apply a vacuum of 29 inches (50 microns) to the total system and hold it for four hours.
3. Break the vacuum with dry refrigerant.
4. Fully charge the system.



Note: Follow standard HVAC charging practices, but use the following recommendations: when the system is properly charged, the superheat should be nominally 15° F (-9° C) and the subcooling 10° F (-12° C).

Final inspection

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



To perform this inspection, see “Final Inspection Checklist” on page 39.

Checklists

Initial Inspection Checklist

Ensure that the:

-
- Installation procedure is complete according to the installation manual.

 - Walls, floor, and ceiling are sealed with vapor barrier.

 - Raised floor space (downflow only) beneath the equipment is a minimum of 12 inches (305 mm) for equipment with capacities up to 50 KW (14 tons) and 18 inches (460 mm) for equipment with capacities over 50KW (14 tons).

 - Floor stand (downflow only) are installed correctly and that the equipment is secured to them.

 - Duct work/plenums are properly installed.

 - Equipment shows no signs of damage.

 - Clearance around the system is in accordance with ASHRAE, local and national code as well as the installation manual.

 - Shipped components (disconnect handles, leak detection devices, condensate pumps, thermostats, display, etc.) are installed securely in the equipment.

 - Refrigerant lines are the correct size and do not leak.
-



Warning: Equipment must be properly de-energized and locked-out prior to performing any service.

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



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



Caution: A vapor barrier minimizes moisture infiltration. Without a vapor barrier, your equipment will have difficulty maintaining the humidity in the room.

Do not introduce unconditioned outside air into the space.

Electrical Inspection Checklist

Ensure that:

-
- Incoming voltages match the phase and voltage listing on the nameplate.

 - The equipment is properly grounded to an earth ground.

 - Electrical connections are tight, including: contactors, terminal blocks, circuit breakers, controllers, switches, relays, auxiliary devices, and field connections.

 - All fuses are correct and securely in the fuse blocks

 - The blower motor overload has the correct setting (FLA of motor on motor nameplate) and make sure that the overload has not been tripped.

 - The OHE signal is terminated at the equipment and condenser (proper wire gauge used).

 - RUG connections are made (if applicable).

 - BMS connections are made (if applicable).

 - The HP switch is functioning properly.



Warning: All electrical wiring must comply with national and local codes.

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

Three-phase electrical service is required.

Mechanical Inspection: Checklist

Ensure that:

- All direct expansion and water/glycol isolation valves are open in the system.

- Water/glycol will flow through the unit for heat rejection.

- All air is bled from the cooling system using the internally mounted Schrader valves.

- There are no water leaks at the humidifier connections.

- The drain line is connected.

- Relief valves are installed and properly vented.

- The blower belts are adjusted correctly.

- The inside of the equipment (especially the blower wheels) is free from debris, before replacing panels.

- Air filters are in place and clean.

- All panels are replaced and secured when all of these checks have been performed.



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

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

Final Inspection Checklist

Ensure that the:

- Interior and exterior of the equipment is clean and free from debris.

- Installed options (smoke detectors, firestat, water detector, remote sensor, remote relay shutdown, dry contact alarm, essential/nonessential lock-out, redundant group control, condensate pump, etc.) are operating correctly.

- Set the setpoints and deadbands.

- Packaging materials are disposed of properly.

- Send the start-up form to APC.

Warranty

Warranty Statement

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

LIMITED FACTORY WARRANTY

APC product covered

NetworkAIR AFX Precision Air Conditioning Unit

Terms of warranty

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

Non-transferable Warranty extends to first purchaser for use

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

Assignment of warranties

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

Drawings, descriptions

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

Warranty claims procedure

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

Exclusions

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

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

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

Warranty Procedures

Claims

You will need the model number of the Product, the serial number, and the date purchased. A technician will also ask you to describe the problem. If it is determined that the Product will need to be returned to APC you must obtain a returned material authorization (RMA) number from APC Customer Support. Products that must be returned, must have the RMA number marked on the outside of the package, and be returned with transportation charges prepaid. If it is determined by APC Customer Support that on-site repair of the Product is allowed, APC will arrange to have APC authorized service personnel dispatched to the Product location for repair or replacement, 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 \$2.50 per pound for refrigerant.

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

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

Parts

- APC warrants the parts of their systems for 1 year 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. After 30 days, the warranty invoice will be outstanding and payment of the invoice will be expected in full.
- Return authorization documentation will be sent with the replacement part. This documentation must be sent back with the defective part to APC for proper identification of the warranty return. Mark the warranty return number on the outside of the package.
- After the part has been received at APC, we will determine the status of the credit based on the findings of the returned part. Parts that are damaged from: lack of maintenance, misapplication,

improper installation, shipping damage, and acts of man/nature will not be covered under the parts warranty.

- Any warranty parts request received before 1:00 PM EST will be shipped same day standard ground delivery. Any costs associated with Next Day or Airfreight will be the responsibility of the party requesting the part.
- Return freight of warranty parts to APC is the responsibility of the party 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) 35434-2021
Australia, New Zealand, South Pacific area	(61) (2) 9955 9366 (Australia)

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

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

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