

User Manual

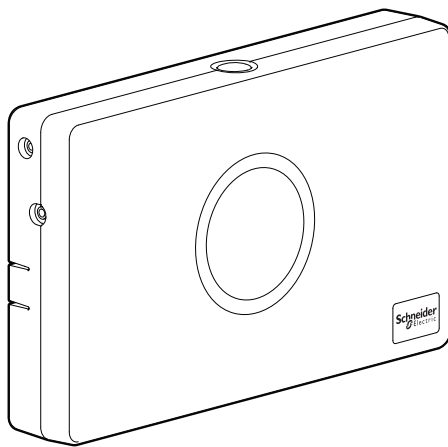
EcoAisle™

Active Flow Controller (AFC)

ACAC22000, ACAC22001, ACAC22005, ACAC22010

990-5557B-001

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Overview

Important Safety Information

Read the instructions carefully to become familiar with the equipment before trying to install, operate, service, or maintain it. The following special messages may appear throughout this manual or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



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



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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

NOTICE addresses practices not related to physical injury including certain environmental hazards, potential damage or loss of data.

Safety Messages

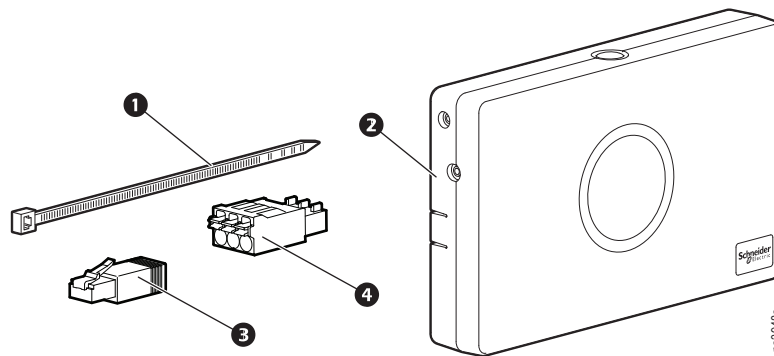
⚠ WARNING
FALLING HAZARD <ul style="list-style-type: none"> • Use a proper ladder when installing equipment. • Use caution to avoid falling off ladder. <p>Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>
NOTICE
ELECTROSTATIC DISCHARGE HAZARD <p>Wear a wrist strap and ensure you are properly grounded before working on the unit.</p> <p>Failure to follow these instructions can result in equipment damage.</p>

Pressure Reading Ranges

SKU	Pressure Reading Ranges
ACAC22000	up to 25 Pa (0.10 in. WC)
ACAC22005	up to 125 Pa (0.50 in. WC)
ACAC22010	up to 500 Pa (2.00 in. WC)

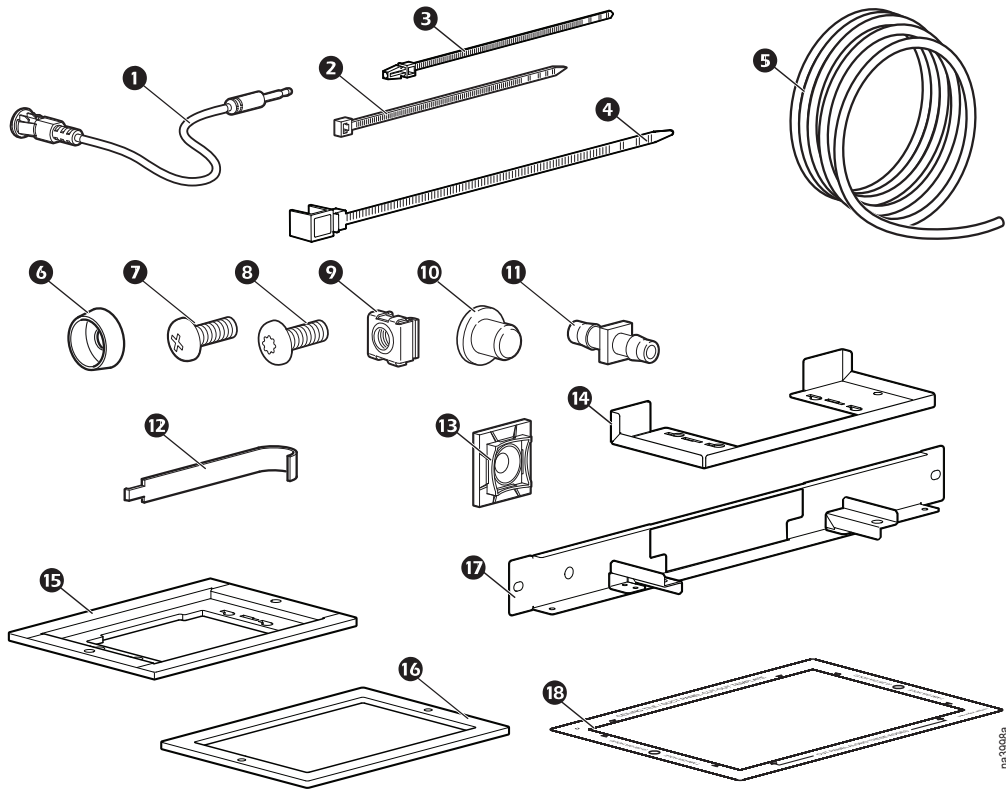
Inventory

Active Flow Controller—ACAC22000, ACAC22005, ACAC22010



Item	Description	Qty	Item	Description	Qty
	Wire ties - black	4	②	Active Flow Controller (AFC)	1
①	Wire ties - red	4	③	Terminator	1
	Wire ties - yellow	2	④	Terminal block	2
	Wire ties - blue	2			

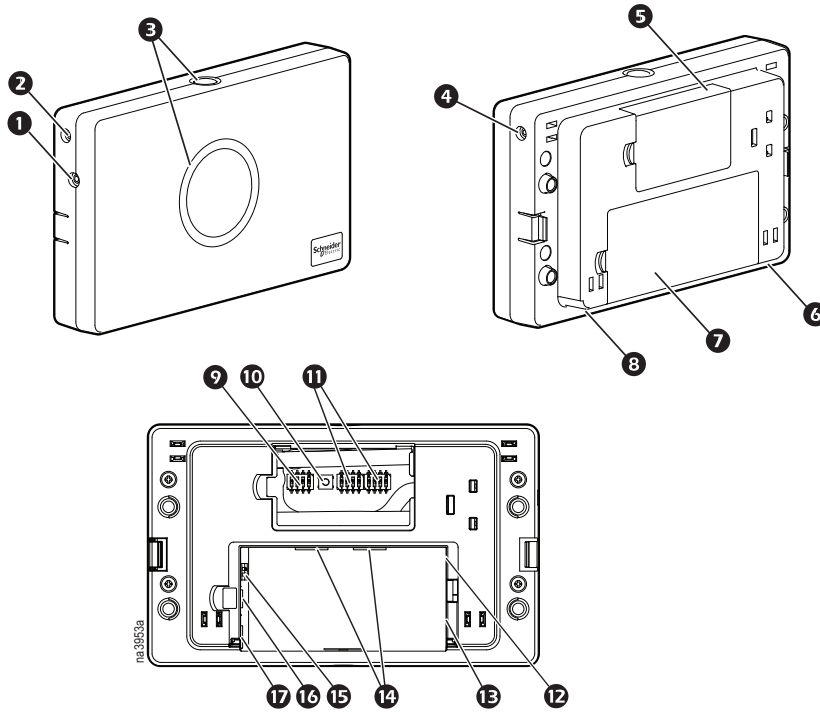
Mounting kit, rack / duct—ACAC22001



na33968a

Item	Description	Qty	Item	Description	Qty
1	Cable assembly, 2.5-mm plug	1	9	Caged nut	4
	Wire ties - black	4	10	Port plugs	4
2	Wire ties - red	4	11	Hose splice barb fittings	4
	Wire ties - yellow	2	12	Caged nut tool	1
	Wire ties - blue	2	13	Wire tie holder	6
3	Nylon push mount	6	14	1U rack mounting bracket	1
4	Tube holder wire tie	10	15	Ceiling/duct mounting bracket	1
5	Tubing	5m (15 ft)	16	Ceiling/duct trim plate	1
6	Cup washers	4	17	1U mounting bracket assembly	1
7	Caged nut screw	4	18	Ceiling/duct cutting template	1
8	Ceiling/duct mounting screws	4			

Containment Airflow Balance Control



Item	Description
1	Console port
2	Front sensing port A
3	Cooling status indicator
4	Front sensing port B
5	Configuration bay access door
6	Rear sensing port A
7	Connection bay access door
8	Rear sensing port B
9	MODBUS baud rate and parity configuration switch bank
10	Reset switch
11	MODBUS address switch bank
12	A-Link IN connector
13	A-Link OUT connector
14	Door switch connectors
15	MODBUS termination switch bank
16	MODBUS connectors
17	DC input power

Installation Considerations

Where to Install

Install one or more Active Flow Controller (AFC) units in each aisle. Quantity and location of AFC units is optional and will be determined by the configuration of your aisle containment system, airflow patterns, and installed equipment.

Door header structure

The preferred location for installing the AFC in the aisle containment systems is in the door header structure (ACDC2xxx series) over the end sliding doors. Those locations contain a ready-made mounting bracket for the AFC unit. The necessary number of AFC units depends on the length of the aisle. See “Aisle Containment—Header Mount” on page 13.

Ceiling

The preferred installation location for aisle containment systems is in the ceiling panels (ACDC1xxx series) at one or both ends of the aisle. In rare installations, an AFC may be required in the center of the aisle. See “Aisle Containment—Ceiling Panel Mount” on page 14.

Rack

If conditions prevent installing AFC units in the ceiling panels, install them in a rack. Other than to avoid placing too close to the floor, installation locations will vary depending upon the best place to measure pressure. In some cases, tubing may be needed to move the measurement point remotely from the AFC. See “Rack Mount” on page 16.

Duct

When air is provided by a remote cooling unit, duct mounting may give the most accurate measurement of airflow. See “Duct Mount” on page 17.

Row scenario

- In a containment system that is less than 4.9 m (16 ft) in length, only one AFC sensor is required.
- In a containment system that is greater than 4.9 m (16 ft) in length, additional AFC sensors may be required.
- At least one AFC sensor is required for each separate containment system.
- AFC sensors are connected in series to the cooling system through the AFC A-Link ports, forming an A-Link BUS for communication between AFC sensors.
- AFC sensors that are installed at the end of the A-Link BUS must have a terminator in the unused port.
- It is not recommended to install AFC sensors in series at the end of the A-Link BUS without using a DC power supply.

Initial Setup

Set DIP Switches

NOTICE

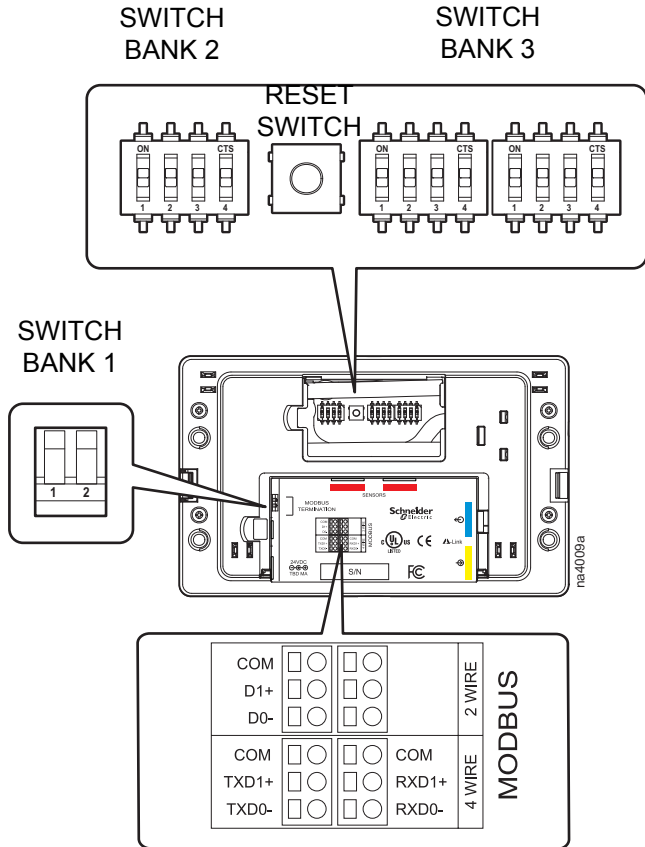
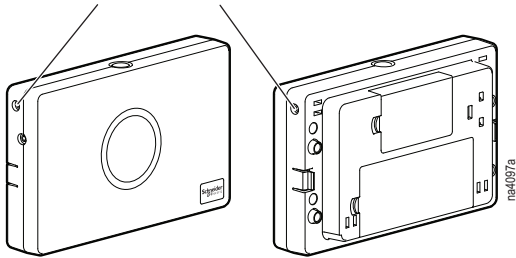
ELECTROSTATIC DISCHARGE HAZARD

Wear a wrist strap and ensure you are properly grounded before working on the unit.

Failure to follow these instructions can result in equipment damage.

The DIP switches on the back of the AFC are not accessible after the unit is mounted, so they must be properly set before installation. The following table defines the purpose of each DIP switch.

FRONT SENSING PORTS



Switch Bank 1

Switch	1	2	-	-	Setting	Usage
Position	UP	UP	-	-	Unterminated	Set to Terminated when the sensor is on one of the two ends of a MODBUS circuit.
	DOWN	DOWN			Terminated	

Note: "UP" switch position is farthest away from the circuit board.

Note: Both switches must be in the same position (either "up" or "down").

Switch Bank 2

Switch	1	2	3	4	Setting	Usage
Position	Off	-	-	-	Normal differential pressure reading	Set to Off when cooling unit supply air is on the same side of the aisle as the front sensing ports.
	On	-	-	-	Reversed differential pressure reading	Set to On when cooling unit return air is on the same side of the aisle as the front sensing ports.
	-	Off	-	-	Baud - 9600	If building management system (BMS) is used, set to BMS baud rate.
	-	On	-	-	Baud - 19200	
	-	-	Off	Off	Parity - Even	
	-	-	Off	On	Parity - None	
	-	-	On	Off	Parity - Odd	
	-	-	On	On	Reserved	

NOTE: The number of stop bits is 1.

Switch Bank 3

Upper 4 address bits				Lower 4 address bits				Usage
1	2	3	4	1	2	3	4	
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	<p>If used in MODBUS slave mode, set to an address that is otherwise unused on the modbus circuit.</p> <p>If used with a non-InRow system, set the address to all zeroes to act as MODBUS master ("Off" position).</p>

Make Communication and Electrical Connections

NOTE: AFC connectors are similar in size. To ensure proper operation, make sure all connections are made correctly.

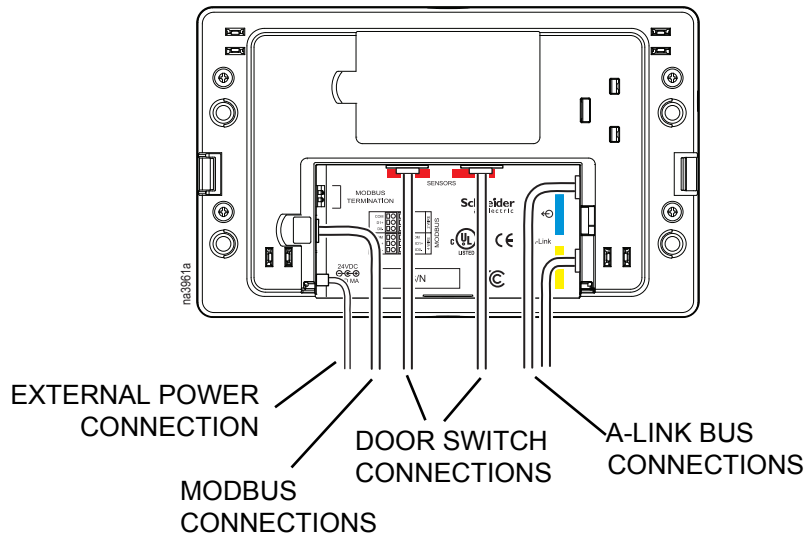
NOTICE
ELECTROSTATIC DISCHARGE HAZARD
Wear a wrist strap and ensure you are properly grounded before working on the unit.
Failure to follow these instructions can result in equipment damage.

The following communication connections can be made:

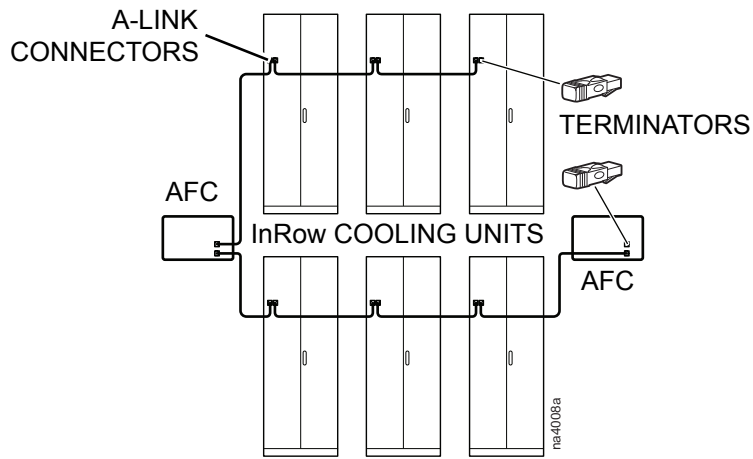
- A-Link (in and out)
- Door switch sensors
- MODBUS

Communication connections

1. Remove the connection bay access door.
2. Plug in the communication connections.
3. Install terminator if required.
4. Replace the connection bay access door.

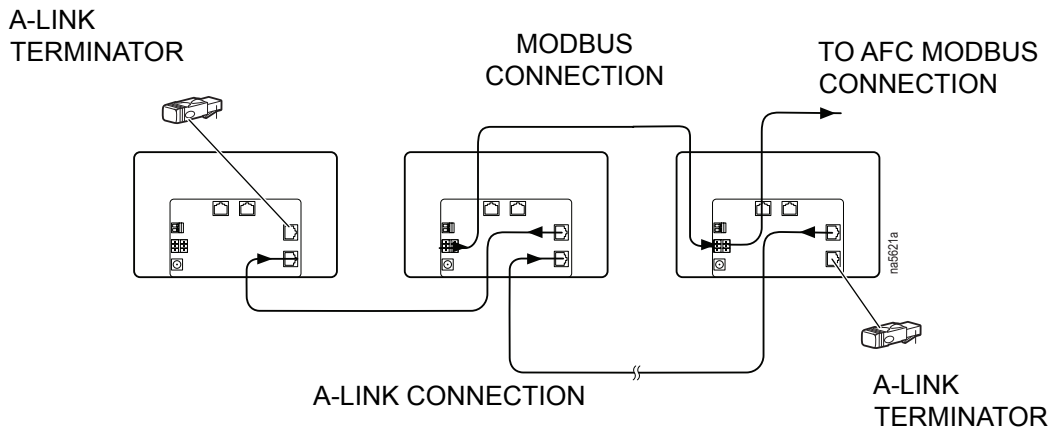


InRow system installation



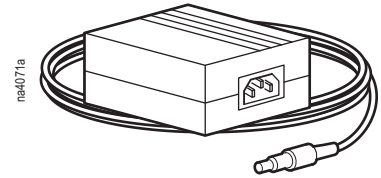
Non-InRow system installation

NOTE: Not all AFCs need to be on MODBUS, but all AFCs need to be connected via A-Link. It is recommended to have at least two AFCs on the MODBUS link.



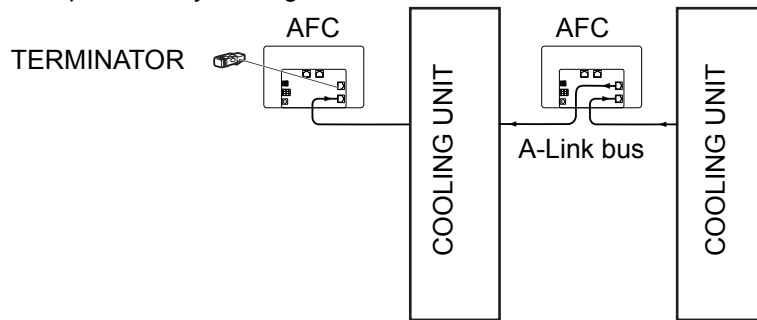
Power considerations

One AFC connected downstream from an InRow cooling unit can be powered by that unit. If a cooling unit is not available, or multiple AFC units are to be connected together, an external power supply (AP9505I) must be plugged into the AFC. Up to five AFC units connected together can be powered by one external power supply connected to the first AFC. The remaining downstream AFC units will be powered through the A-Link bus.

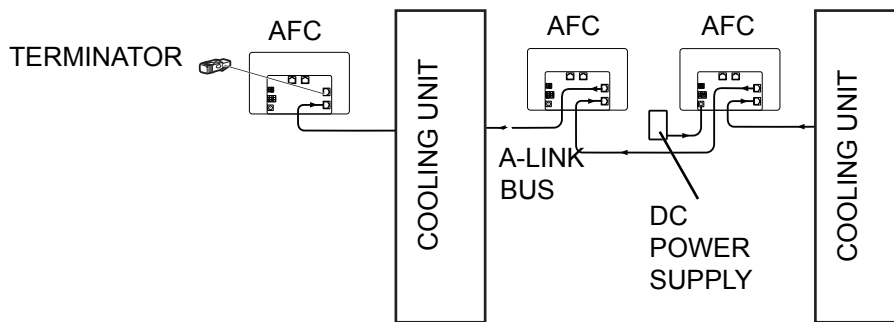


NOTICE
UNAUTHORIZED EQUIPMENT
Do not use any external power supply other than the recommended unit.
Failure to follow these instructions can result in equipment damage and void warranty.

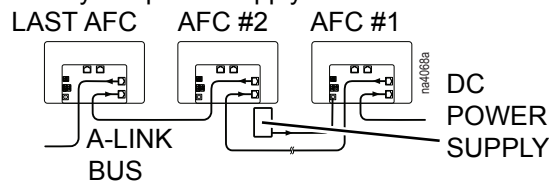
Each AFC powered by cooling unit



AFCs powered by DC power supply and cooling unit



Multiple AFCs powered by DC power supply



If an external power supply is required, connect it to the first AFC and to a convenient electrical outlet.

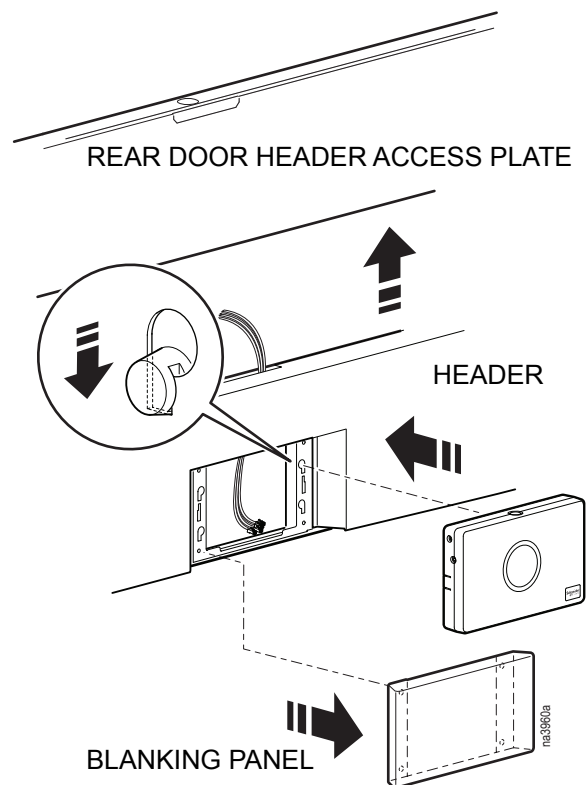
NOTE: The external power supply is not redundant to the A-Link bus. Therefore, if an external power supply fails, the AFC will not receive power through the A-Link bus.

Hardware Installation

Aisle Containment—Header Mount

NOTE: This is the preferred installation method for aisle containment systems in the door header structure (ACDC2xxx series) over the end sliding doors.

1. If installed, remove and discard the blanking panel.
2. After the door has been assembled, remove the rear door header access plate and route the cables through the header before mounting the AFC.
3. Ensure all DIP switches are set properly.
4. Install the switch and wiring access plates in the rear of the AFC.
5. Connect wiring to the AFC and reinstall the rear door header access plate.
6. Install the AFC onto the header. Slide down until it locks into place.



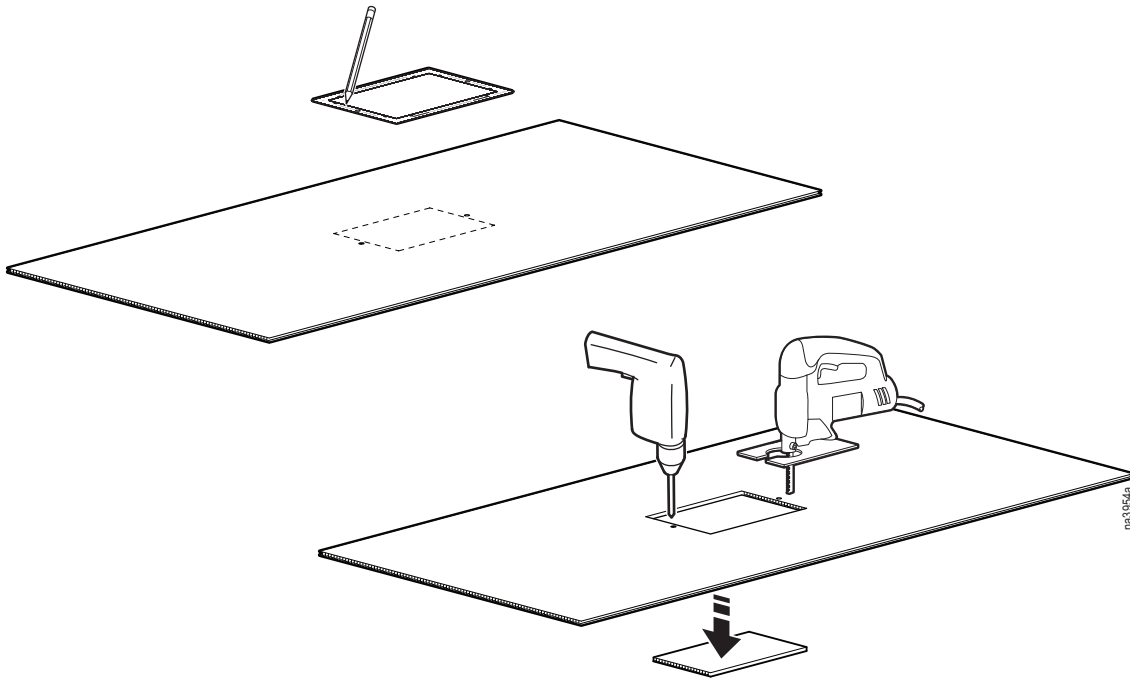
Aisle Containment—Ceiling Panel Mount

This is the preferred location for AFC units: in the ceiling panels (ACDC1xxx series) at one or both ends of the aisle.

1. Determine where the AFC is to be located.

NOTE: Mount in the center of a ceiling panel. Avoid placing the AFC near any source of strong air currents.

2. Using the provided template mark the location of the cutout.
3. Using a saw or other suitable tool, cut out the opening. Use a 6-mm (1/4-in.) drill to create holes for the fasteners.

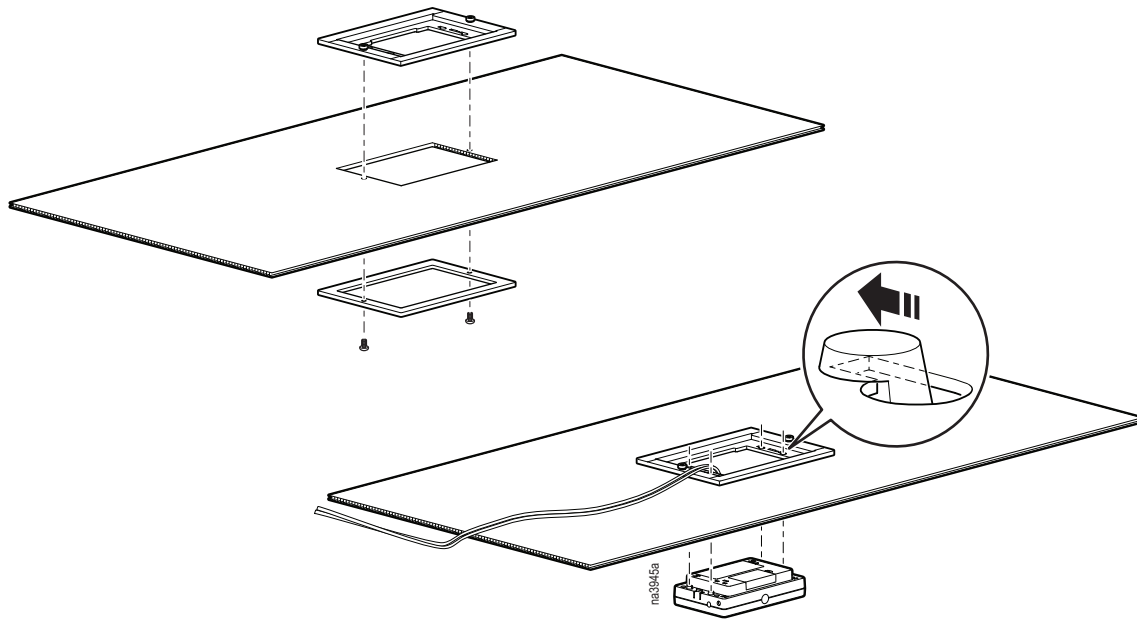


4. Assemble the bracket as shown.
5. Ensure all DIP switches are set properly.

6. Connect wiring to the AFC.

NOTE: Route wiring to the outside of the ceiling panels as much as possible to allow panels to drop down in case of fire.

7. Install the AFC onto the bracket. Slide until it locks into place.



Rack Mount

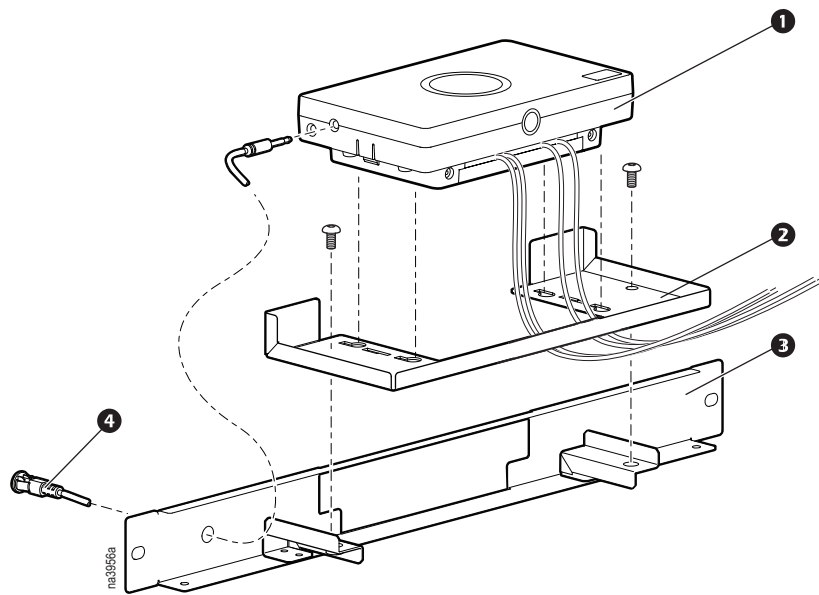
NOTICE

HAZARD TO EQUIPMENT

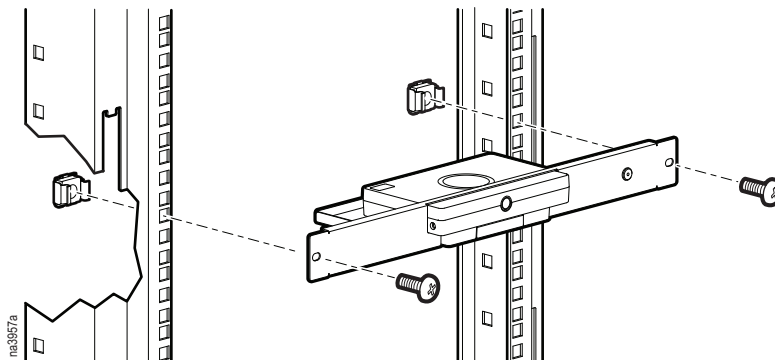
Dirt and dust in the pressure sensor can cause damage. Avoid placing the AFC too close to the floor.

Failure to follow these instructions can result in equipment damage.

1. Connect all wires to the AFC **1** and replace the cover.
2. Ensure all DIP switches are set properly.
3. Install the AFC **1** onto the retaining bracket **2**.
4. Attach the retaining bracket **2** onto the 1 U bracket **3** using the fasteners provided.
5. Install the console port cable assembly **4** through the retaining bracket and into the console port of the AFC **1**.



6. Install the 1 U AFC and bracket assembly into the rack enclosure using two M6 × 16 Phillips screws, two caged nuts, and two plastic washers (provided).

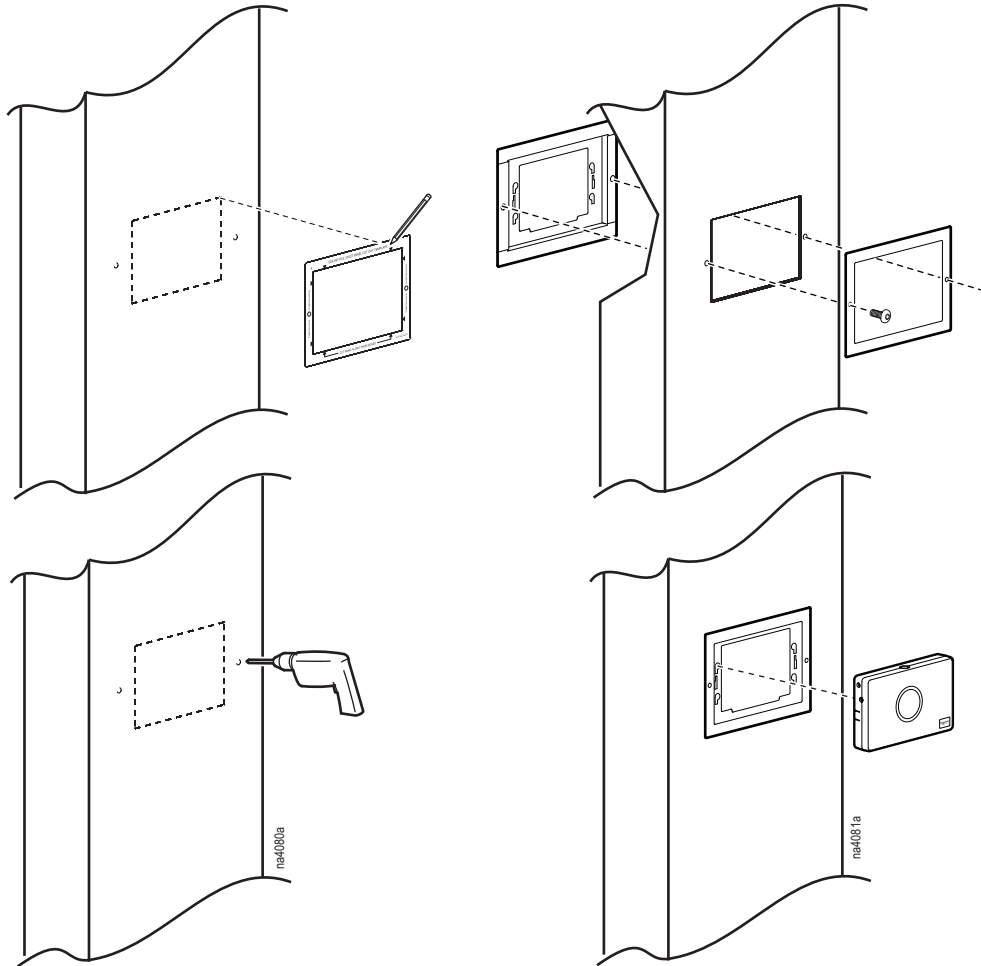


NOTE: Do not mount the AFC between large equipment (for example, two blade servers), which can influence air pressure measurements. If air disturbances cannot be avoided, use pressure sampling extension tubes See “Using Pressure Sampling Extension Tubes” on page 18.

Duct Mount

When a duct mounting is required (in a room cooling scenario), mount the AFC in the center of a duct panel as shown.

1. Determine where the AFC is to be located.
2. Using the provided template mark the location of the cutout.
3. Using a saw or other suitable tool, cut out the opening. Use a 6-mm (1/4-in.) drill to create holes for the fasteners.



4. Assemble the bracket as shown.
5. Ensure all DIP switches are set properly.
6. Connect wiring to the AFC.
7. Install the AFC onto the bracket. Slide until it locks into place.

Using Pressure Sampling Extension Tubes

NOTE: Pressure sampling extension tubes are used in rack mount scenarios only.

Pressure sampling extension tubes effectively move the ports to remote locations to avoid erroneous readings caused by local air disturbances. Since installations differ, whether tubes are used and their location results from individual needs.

NOTE: Kinked, blocked, or damaged tubing will result in incorrect operation of the AFC units.

1. Push one end of the included tubing into a port on the rear of the AFC. Be sure the tube is firmly captured by the port fitting.

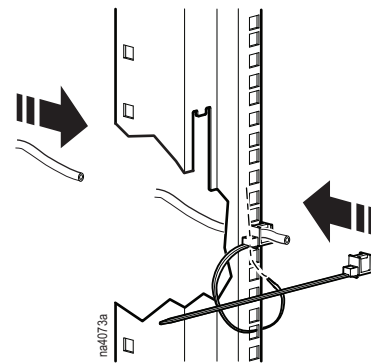
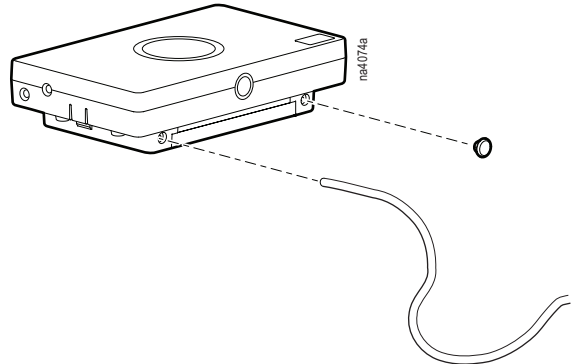
2. Insert a plug into the other port. Be sure the port is completely sealed.

NOTE: Failure to properly seat the tube and plug will result in incorrect operation.

3. Route the tube to the rear of the enclosure and trim as necessary.

NOTE: The optimum location for the end of the tube (remote sensor) may vary depending on operational results. At first, mount it at a point about 1/4 of the way down from the top of the enclosure and move as necessary.

4. Push the other end of the tube through a tube holder wire tie and secure the wire tie to the rear of the enclosure.



Configuration

Your cooling unit must be configured to work with the AFC.



For more information, see the operation and maintenance manual specific to the cooling units being served by the AFC units.

AFC Synchronization

If more than one AFC is present in an air containment system, they can be grouped to share their measurements and status. This is not required for proper operation, however it does allow for consistent status reporting for all AFC units sharing a common environment. Proceed as follows:

1. Gain access to the reset button at the rear of all AFC units in the group.
NOTE: Rack-mounted AFC units will need to be removed from the mounting brackets to gain access to the reset button.
2. Press and hold the reset button on the first AFC to synchronize until its status lights turn off.
3. Release the reset button. The status lights begin to blink blue, indicating that the AFC is in the synchronization learn mode. While in this mode, the AFC searches for any other AFC units that are also in synchronization learn mode.
4. Within two minutes, move to the next AFC in line and repeat steps 2 and 3.
5. Repeat for all AFC units in the group.
6. To remove an AFC from a synchronization group, place it in the synchronization learn mode as previously described, ensuring no other AFC units are in the synchronization learn mode. After a two minute delay, the AFC automatically exits the synchronization learn mode and is removed from the group.

Troubleshooting

Problem	Definition	Corrective Action
Logo light is lit; cooling status indicator LED is not lit.	Indicates a problem on the circuit board.	<ul style="list-style-type: none"> Remove and restore power to the AFC unit.
Cooling status indicator LED is flashing red.	Indicates a failed DP sensor.	<ul style="list-style-type: none"> Remove and restore power to the AFC unit. If still flashing, replace the AFC unit.
Cooling status indicator LED is red.	Indicates that server airflow is greater than available cooler airflow.	<ul style="list-style-type: none"> Remove and restore power to the AFC unit. Ensure that all coolers are powered and operating normally. Ensure that pressure ports are open. Ensure that the AFC sensor is configured properly (DIP switches). Ensure that containment system doors are closed, roof panels are in place and blanking panels are installed on ALL open U-spaces.
Cooling status indicator LED is blue.	Indicates that measured containment system cooling airflow is significantly greater than server airflow.	<ul style="list-style-type: none"> Remove and restore power to the AFC unit. Ensure that pressure ports are open. Ensure that the AFC sensor is configured properly (DIP switch). User may wish to synchronize AFCs. <p>NOTE: Synchronizing AFCs is not always recommended as local pressure variants can help determine loading issues.</p>
Cooler airflow does not match expected airflow.		<ul style="list-style-type: none"> Ensure that AFC sensors are receiving power (lights on). Ensure that AFC sensors are connected to A-Link. Ensure that all AFC sensors are configured properly (DIP switch). Ensure that AFC pressure ports are open. Ensure that AFC "bias" setting is properly set (recommended setting is 0). Ensure that containment system doors are closed, roof panels are in place and blanking panels are installed on ALL open U-spaces.

Maintenance

Periodic Maintenance

<i>NOTICE</i>
<p>DAMAGE TO FINISH</p> <p>Do not use harsh chemicals to clean the unit.</p> <p>Failure to follow these instructions can result in equipment damage.</p>

1. Clean dust from the unit using a soft lint free cloth or a soft bristle brush.
2. Inspect the unit to:
 - a. Ensure it is securely mounted.
 - b. Ensure all electrical and data connections are secure.
 - c. Ensure tubing (if used) is clean and not kinked, damaged, or blocked.

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Connect to localized Schneider Electric Web sites for specific countries, each of which provides customer support information.
 - **www.schneider-electric.com/support/**
Global support searching Schneider Electric Knowledge Base and using e-support.
- Contact the Schneider Electric Customer Support Center by telephone or e-mail.
 - Local, country-specific centers: go to **www.schneider-electric.com > Support > Operations around the world** for contact information.

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