

InRow[®] OA and Accessories Pumped Refrigerant - 50/60 Hz



SKUs
ACOA500
ACOA501

Technical Data

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SKU Selection	Width	Voltage	Plug Type
ACOA500	600 mm	100-120V 50/60 Hz	NEMA L5-20P
ACOA501	600 mm	200-240V 50/60 Hz	IEC-309 16A

Overview

The InRow OA offers efficient, effective, and economical cooling.

Critical environmental requirements now reach far beyond the confines of the traditional data center or computer room to encompass a larger suite of applications referred to as technology rooms. Critical environment applications include:

- Computer rooms
- Telecommunication facilities
- Clean rooms
- Power Equipment
- Medical equipment rooms
- Archives
- LAN/WAN environments

A worldwide network of APC representatives is fully qualified to provide engineering, sales, installation, and service for our products. APC warrants all parts for 12 months from commissioning or 18 months from the shipping date. Parts and labor is warranted if factory start-up is conducted. Extended warranties are available.

Capacity

The InRow OA unit provides cooling using low temperature R134a refrigerant supplied by a Refrigerant Distribution Unit (RDU). The InRow OA is capable of providing up to 27 kW of cooling capacity.

Configuration

Pumped refrigerant.



Note: This unit must be used with an RDU.

Compliance Approval

- UL Listed
- C-UL Listed
- CE
- KCC
- C-Tick
- PSE

Standard Features

- Rack or ceiling mounted
- Dual power inputs (A-B feed) via locking NEMA or IEC plug
- Variable speed direct drive mixed flow AC fan assembly
- Integrated LED aisle lighting, activated by a motion detection system
- Remote temperature sensor
- No minimum loading required
- Controlled relative to dewpoint
- Mounted over the hot aisle
- Integrated thermal containment
- Integrated piping support
- Aisle width independent
- Active response controls
- Rack neutral

Accessories

- Mounting frames
- Rack mount kit
- Ceiling containment assemblies
- Pipe clamps
- End cap
- End aisle containment
- Modular piping
- Stainless steel flex piping

Optional Features/Accessories

- HACS door

Refrigerant

Mitigating the risk of fluid leaks is critical to the smooth operation of a technology room. Data centers can be installed where raised floors are not available. This hard floor environment requires that the cooling fluid piping be installed overhead. The fluid used in this modular, pumped refrigerant system is R134a refrigerant. R134a is a non-toxic refrigerant that poses no threat to IT equipment in the event of a leak, and has no ozone depletion potential.

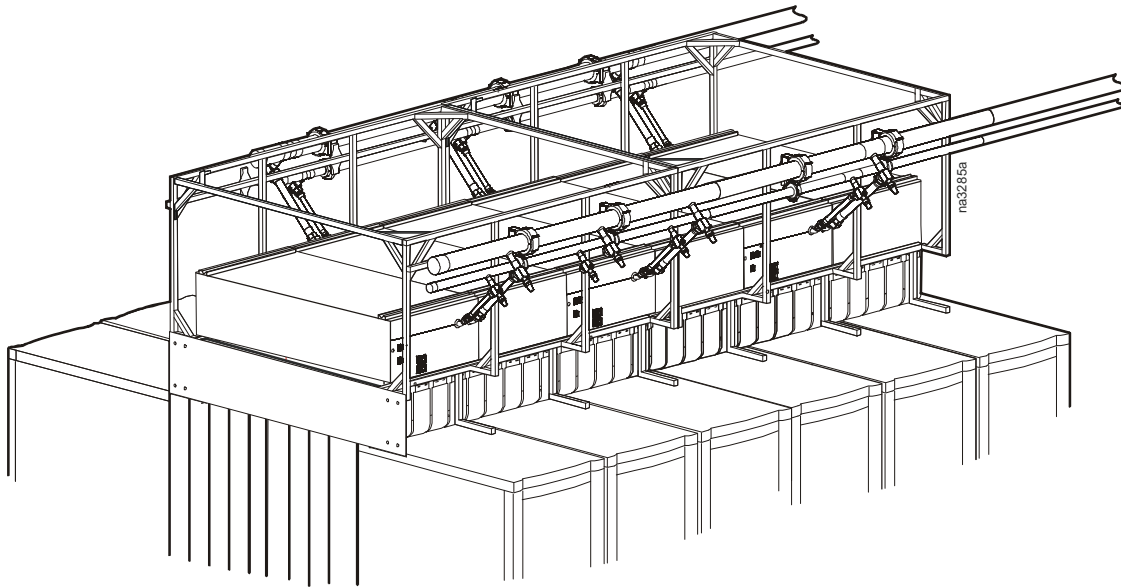
APC Pumped Refrigerant System, The Right Solution

Highly scalable and flexible, the system is capable of growing with your cooling needs as they increase. This system offers a zero whitespace solution that provides the option to be rack mounted or suspended from the ceiling. Ideal for high density environments, the InRow OA integrates thermal containment for maximum energy efficiency.

Scalable Solution for Critical Environments

InRow Advantages

InRow cooling products improve energy efficiency and cooling ability in a number of ways. First, the InRow OA draws air directly from the hot aisle, allowing it to take advantage of higher heat transfer efficiency due to higher temperature differences. It can then discharge cool air directly back into the IT environment. This increases energy efficiency by reducing the distance that the air has to be moved to provide adequate cooling to the IT equipment. Row based cooling close couples the cooling units to the IT load, which enables the units to operate at a higher return and supply air temperatures yielding 100% sensible capacity.



Scalable for Any Density

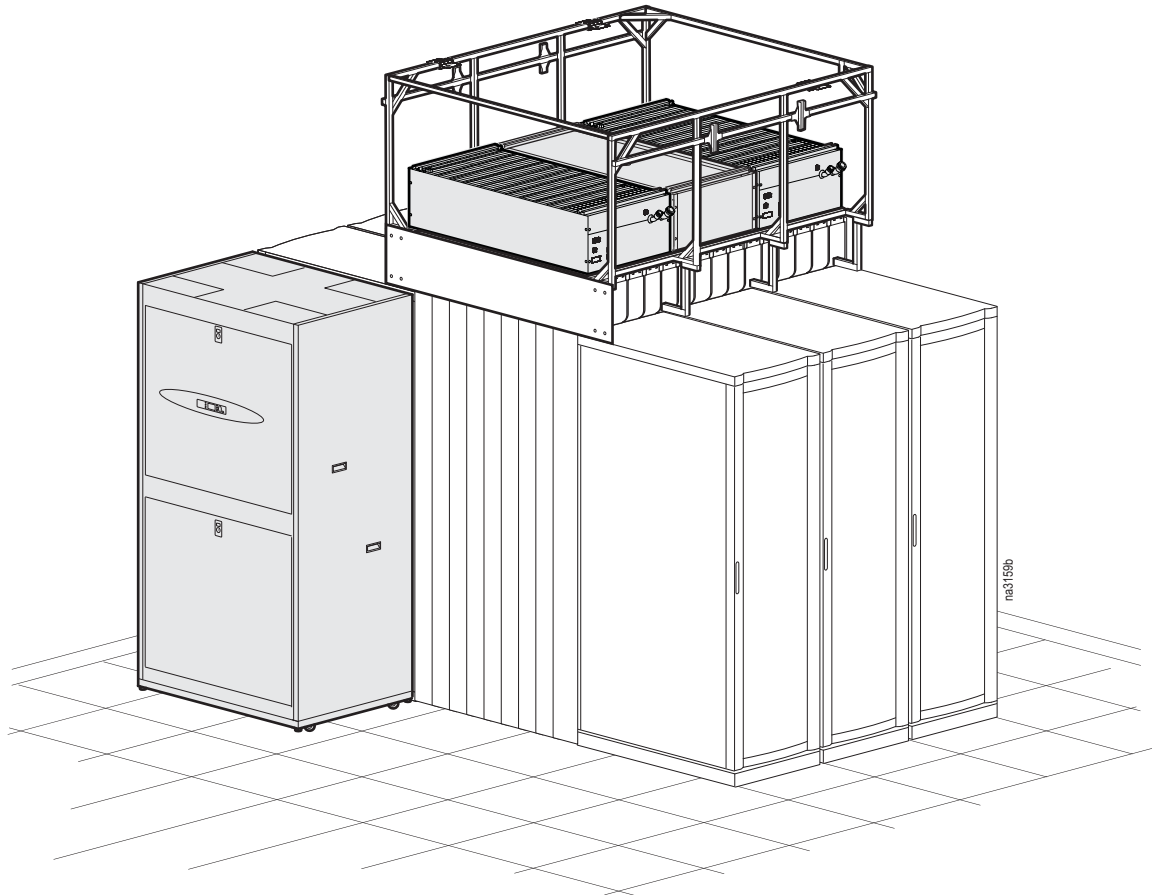
The predictable performance of the row-based architecture makes it well-suited for high density applications. The focus on heat removal instead of cold air delivery is the key to making this approach scalable. The modular design of the InRow units allows them to be easily added above the hot aisle as the demand for cooling increases.

The additional benefit of the row-based architecture is the ability to add thermal containment. Containing the hot aisle further reduces any chance of hot and cold air streams mixing. This provides ultimate predictability and allows the cooling capacity to be matched to the IT heat load.

Thermal Containment System

InRow OA units, ceiling containment assemblies, and heavy vinyl curtains are used to enclose the hot aisle. This increases the densities that can be handled in a single rack enclosure by eliminating mixing of hot and cold air streams. This method is called load neutralization. Heat is removed from the hot aisle, cooled, and then returned to the surrounding room area at or slightly below room temperature. The warmer return air temperatures that are achieved in this application increase the capacity of the cooling unit.

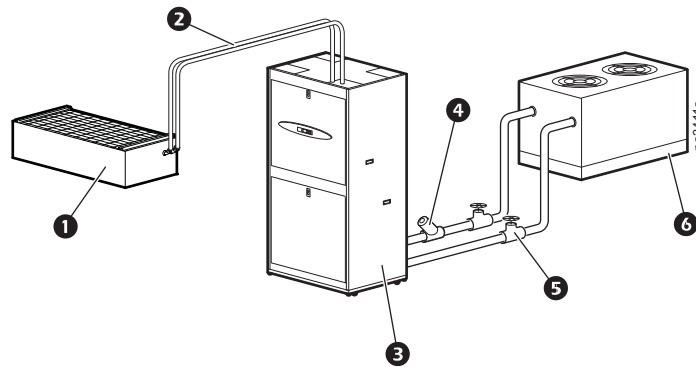
The enclosed hot aisle prevents any warm return air from mixing with cold supply air. In effect, all surrounding room air can act as supply air to the system. The thermal containment system is beneficial in any environment. It can be deployed quickly in any controlled space without expensive additions to the infrastructure, such as raised flooring or ductwork.



Configuration

Chilled water systems utilize water from a chiller plant for cooling. Chilled water is commonly used in large buildings and high rises and can serve multiple indoor units, which can be cost effective for large install options.

There are various methods for chilled water piping. The illustration below shows an InRow OA receiving pumped refrigerant from a centralized RDU which is in turn connected to a chiller plant.



- | | |
|----------------------|--------------|
| ❶ InRow OA | ❷ Strainer** |
| ❸ Refrigerant piping | ❹ Valve** |
| ❺ RDU* | ❻ Chiller |

Note: Install isolation valves and particulate strainers with 20 mesh stainless steel screen (opening size = 865 micron) in the supply line between the chiller and RDU. For more information, see the InRow OA Installation Manual.

*The RDU is a required unit available through APC. For more information, see the RDU Technical Data Manual.

**Piping between the chiller and the RDU will vary based on local codes and site conditions.

Standard Features

Cabinet



The frame is constructed of extruded aluminum for light weight and maximum strength. External panels are constructed of aluminum to reduce weight. The bottom exterior panels are constructed of 18 gauge perforated aluminum with a 69.5% open free area. Key locks provide a means of securing access to the internal components of the unit.

Full service to the unit is provided through bottom access (located in the hot aisle).

Electronics Module

A retractable electronics module is provided for easy service access from the bottom of the unit located in the hot aisle.

Remote Shutdown

The unit is capable of being shutdown either local to the unit or remotely through the RDU or web interface.

Rack Neutral

The OA has been designed to be independent of the racks below it, whether non-APC racks or racks of varying widths.

Cooling Coil

The cooling coil is an aluminum micro-channel heat exchanger supported by 14 gauge galvanized steel. The micro-channel improves heat transfer and thermal performance.

Variable Speed Fans

Two 400 mm diameter variable speed mixed flow direct drive AC axial fans provide uniform air flow over the entire face of the coil.

Each fan assembly has a plastic injection molded bezel with a cage-type finger guard on the inlet side.

The fans are independently replaceable without the use of tools while the unit is in operation.

Active Response Control

The active response control monitors rack inlets and controls cooling capacity to match the IT heat load. Included is a user-friendly interface for ease of operation.

Failure Notification

Several components within the unit will provide a warning that service is needed.

Lights

Integrated lighting is provided in the bottom of the cooling unit. The low energy-consuming LED lighting is controlled via a motion detection sensor. This lighting replaces the lighting in the hot aisle.

Remote Temperature Sensor

A field-installed remote temperature sensor is placed to provide control input based on rack inlet temperature.

Dual Power Feeds

Dual power inputs are supplied to the unit for power redundancy and protection via a locking NEMA or IEC plug connection suitable for the input power selected.

Easy Installation

Rollers are included for ease of installation and removal through the use of an integrated railway system.

Aisle Width Independent

The system has been designed to allow installations over hot aisles between 914 mm and 1200 mm (3 ft and 4 ft) wide.

Optional Features

Flexible Stainless Steel Hoses

914 mm (3 ft) and 1828 mm (6 ft) flexible stainless steel hoses are available for use in installations where the header piping is not mounted to the OA mounting system, allowing flexibility in header/connection placement.

InRow OA Mount Frames

Installations can use one or more 1800 mm mount frames to support InRow OAs. Depending on aisle length, some installations may require a 2200 mm mount frame (optionally cut to size) in order to occupy the remaining space above the aisle. In addition, the mount frames can support piping and thermal containment. Mount frames may be directly installed on the equipment racks or suspended from the ceiling.

Individual Unit Ceiling Suspended

An individual unit may be suspended from the ceiling.

Ceiling Containment Kits

These assemblies are used to occupy empty space in the row while maintaining the integrity of the air flow and providing means to remove and install overhead units in an existing system.

Rack Mount Kit

This kit contains the parts and fasteners necessary to install the mounting frame directly on top of a row of equipment racks.

Pipe Clamp Kit

This kit contains clamps, fasteners, and insulation needed to mount refrigerant piping on the mounting frames, hang piping from structures, or hang piping from the ceiling.

Hot Aisle Containment System (HACS) Doors

Solid HACS doors may be used at the ends of the hot aisle instead of the vinyl curtain system.

End Cap Kit

This kit contains various panels, fasteners, and hardware needed for mounting the overhead units on the mounting frame and to isolate the hot and cold air streams.

End Aisle Containment Kit

This kit contains heavy vinyl air curtains that may optionally be used at the ends of a hot aisle.

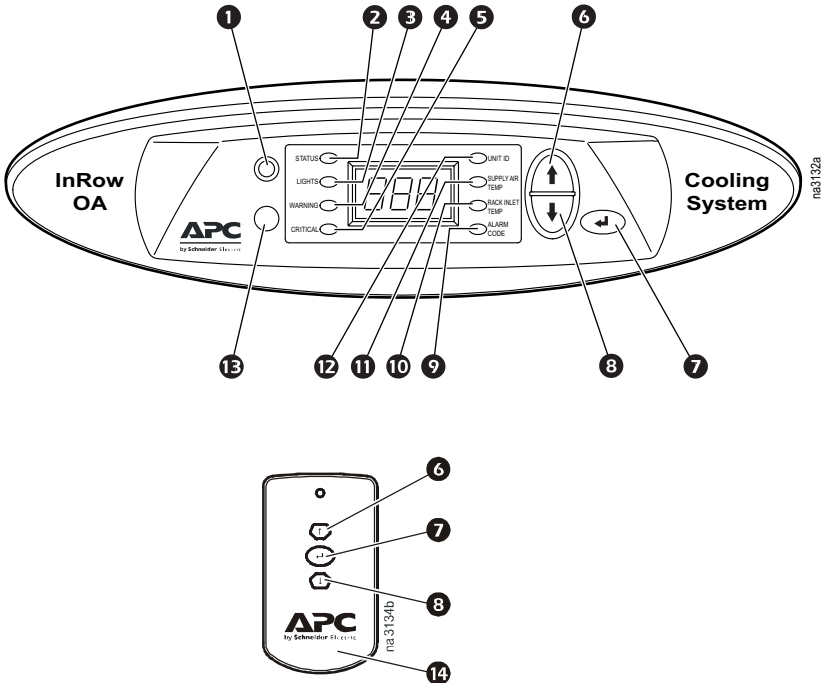
1, 2, And 3-port Modular Piping Kits

These kits provide three optional solutions for routing refrigerant to and from the InRow OA units. They may be installed directly on the InRow OA mount frames, hung from threaded rod, or attached to support members.

Network cable

Various lengths of network cable are available to ship with your cooling system. The network cable is used to interconnect multiple cooling units in a group, as well as to connect back to the RDU.

Microprocessor Controller



Item	Description
1	Infrared remote control receiver
2	Status LED
3	Lights LED
4	Warning LED
5	Critical alarm LED
6	Menu selection scroll up key
7	Enter key
8	Menu selection scroll down key
9	Alarm code LED
10	Rack inlet temperature LED
11	Supply air temperature LED
12	Unit ID LED
13	Motion sensor for lights
14	Infrared remote control

Microprocessor Control

The master display allows monitoring and configuring the air conditioning unit. Available functions include status reporting, set-up, and temperature setpoints. Four LEDs report the operational status of the connected cooling unit.

Controls

The microprocessor controller comes equipped with control keys to allow the user to navigate between menus and select items.

Alarms

The microprocessor controller activates a visible and audible alarm in the occurrence of the following events:

- Internal communications fault
- Cooling failure
- Rack inlet high temperature
- Rack inlet temperature sensor
- Fan fault
- Power feed failure

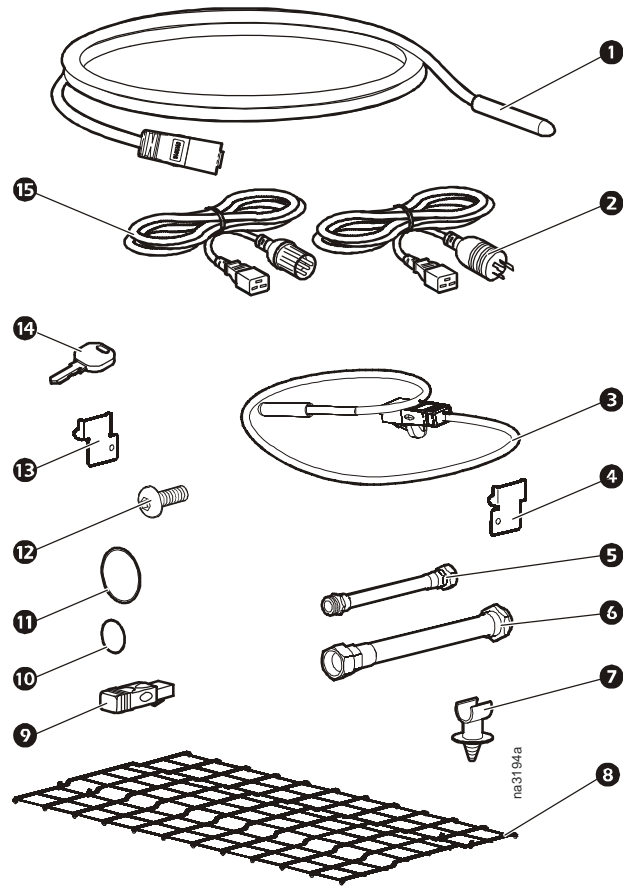
- Supply air high temperature
- Return air high temperature
- Group communications lost
- Air filter service interval expired
- Evaporation temperature below dewpoint
- Fan 1 door open
- Fan 1 fault
- Fan 1 missing or wrong type
- Fan 2 door open
- Fan 2 fault
- Fan 2 missing or wrong type
- Fan 3 fault (RA only)
- Fan 4 fault (RA only)
- Fan 5 fault (RA only)
- Fan type not configured
- Liquid inlet pressure sensor fault
- Liquid temperature sensor fault
- Primary power source overvoltage
- Rack temperature sensor fault
- Rack temperature high violation
- RDU communication fault
- Return air temperature sensor fault (front)
- Return air temperature sensor fault (middle)
- Return air temperature sensor fault (rear)
- Secondary power source overvoltage
- Supply air temperature sensor fault (front)
- Supply air temperature sensor fault (rear)
- Unit ID needs configuration
- Unit personality not configured
- Vapor outlet pressure sensor failure
- Evaporation temperature below dewpoint
- Unit is in maintenance mode

Display Interface

The three-digit, seven-segment display displays the status of the unit, and may be actuated via the infrared remote control.

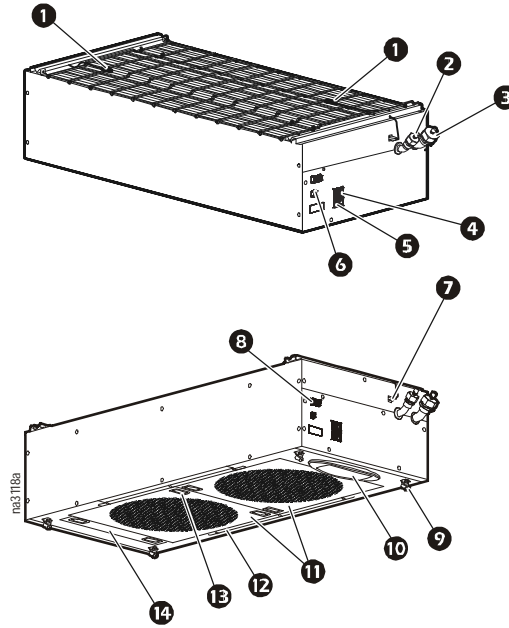
Component Identification

InRow OA loose parts



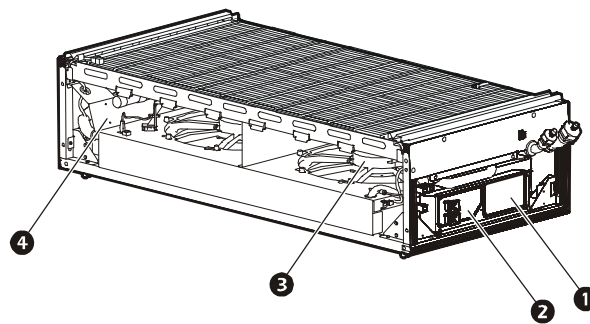
Item	Description	Qty	Item	Description	Qty
1	Remote temperature sensor	1	9	A-Link terminator	1
2	Power cord, L5-20P (ACO500 only)	2	10	Teflon ring, 1-1/4 in	4
3	Supply air temperature sensor	2	11	Teflon ring, 1-3/4 in	4
4	ACO A mounting clip, right hand	2	12	Pan head Torx screw	5
5	Supply header connection	1	13	ACO A mounting clip, left hand	2
6	Return header connection	1	14	Key	2
7	Cable clip	3	15	Power cord, IEC 309 (ACO501 only)	2
8	Grille	1			

InRow OA exterior components



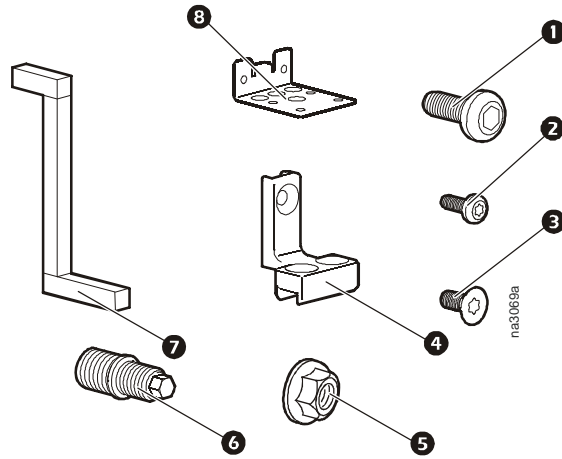
Item	Description
1	Supply air temperature sensors
2	Refrigerant supply connection
3	Refrigerant return connection
4	Primary electrical power inlet
5	Secondary electrical power inlet
6	Rack temperature probe connection
7	Rear air supply temp connection (front not shown)
8	A-link connections
9	Roller
10	Display interface
11	Fan access panels
12	Lights, LED aperture class 1
13	Latch
14	Electrical board access

InRow OA interior components



Item	Description
1	Relay board
2	Line filter board
3	Fan and shroud assembly
4	Main control board

Rack mount kit - ACAC11000

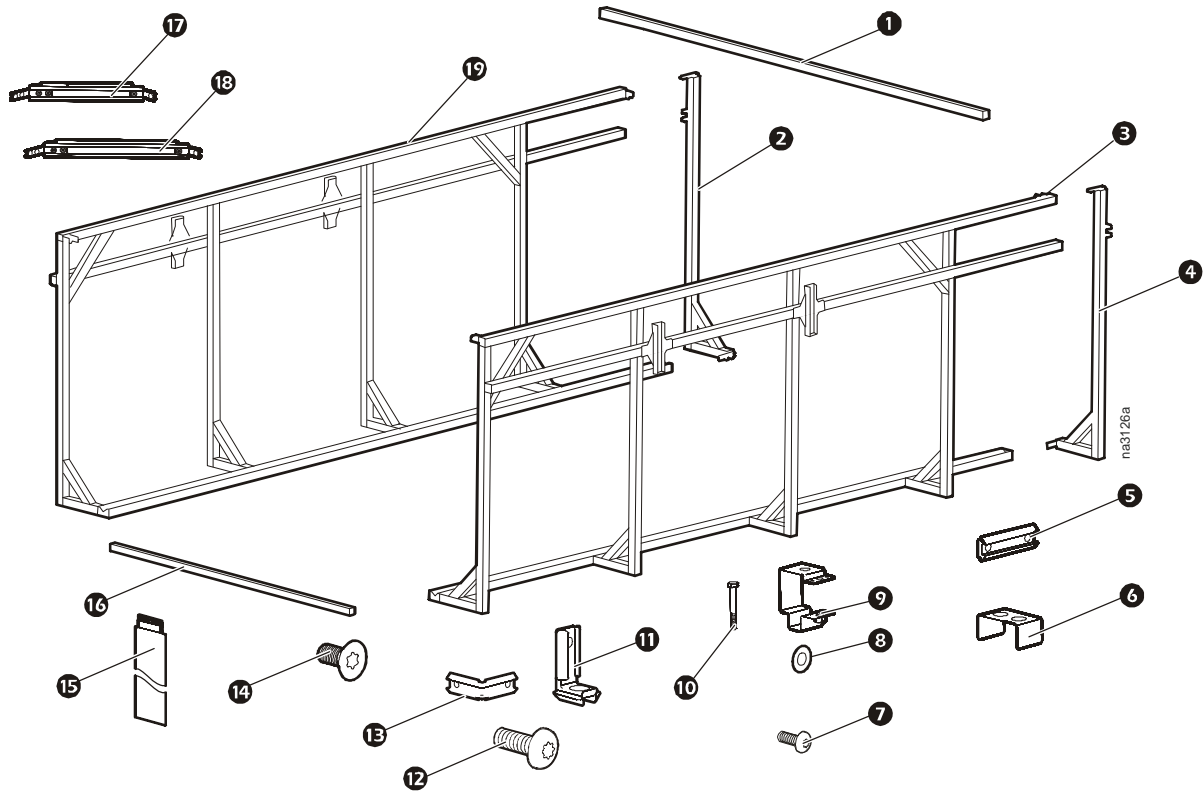


Item	Description	Qty	Item	Description	Qty
1	Screw, M10 × 16, M6 pan head	8	5	Flanged hex nut, M10	8
2	Screw, Torx M4 × 8 pan head	17	6	Adapter stud M12 x M10	8
3	Screw, Torx M4 × 8 flat head	25	7	Support leg assembly	8
4	Connector, frame, 25 mm drop-in, 90 degree cross	8	8	Rack mount plate bracket	8



Note: Depending on system configuration, you may have extra parts remaining after assembly.

InRow OA mount frame, 2200 mm (3-unit) - ACAC11002

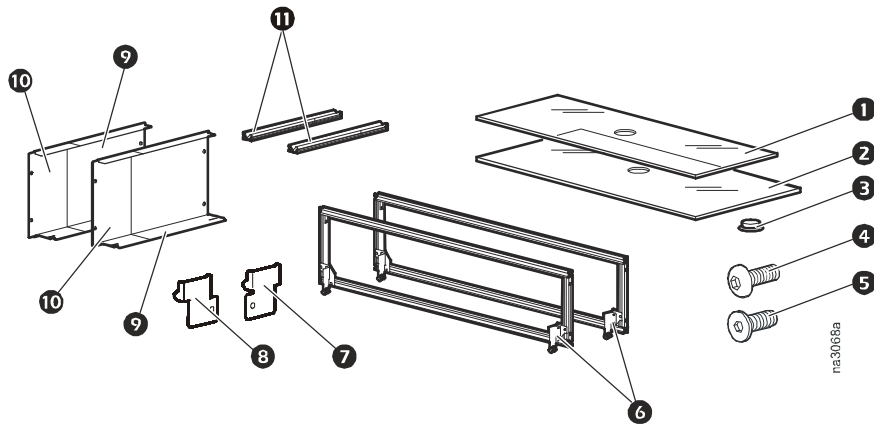


Item	Description	Qty	Item	Description	Qty
1	Upper cross rail, 1510 mm	2	11	Frame end connector, 25 mm	4
2	Right hand vertical support assembly	1	12	Torx screw, M4 × 8 mm pan head	4
3	Right side OA mount frame assembly	1	13	Frame corner connector, 25 mm	20
4	Left hand vertical support assembly	1	14	Torx screw, M4 × 8 flat head	88
5	Frame slide-in splice connector, 25 mm	8	15	Side air block strip assembly (190 mm × 300 mm)	32
6	Frame joining clip	2	16	Cross-aisle beam, 1150 mm	5
7	Torx screw, M4 × 12 mm	4	17	Gusset, 190 mm	4
8	Flat washer	4	18	Gusset, 250 mm	4
9	Extrusion hanger bracket	4	19	Left side OA mount frame assembly	1
10	Hex bolt, M10 × 80 mm	4			



Note: Depending on system configuration, you may have extra parts remaining after assembly.

Ceiling containment kit (300-450 mm) - ACAC11003

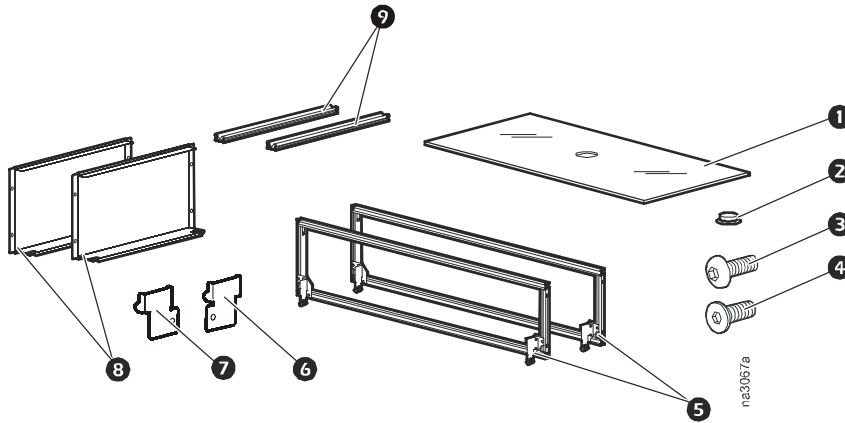


Item	Description	Qty	Item	Description	Qty
1	Ceiling tile, 300 mm	1	7	ACOA mounting clip, right hand	2
2	Ceiling tile, 450 mm	1	8	ACOA mounting clip, left hand	2
3	Hole plug	1	9	End panel, LH	2
4	Torx screw, M4 × 8 pan head	5	10	End panel, RH	2
5	Torx screw, M4 × 8 flat head	13	11	Extrusion - V-track, scored	2
6	Side frame assembly	2			



Note: Depending on system configuration, you may have extra parts remaining after assembly.

Ceiling containment kit (600 mm) - ACAC11004

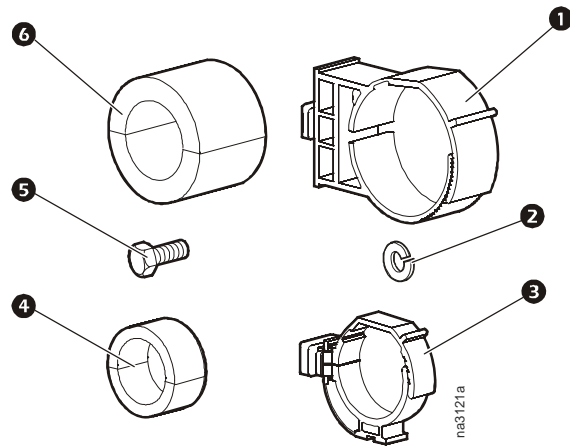


Item	Description	Qty	Item	Description	Qty
1	Ceiling tile, 600 mm	1	6	ACOA mounting clip, right hand	2
2	Hole plug	1	7	ACOA mounting clip, left hand	2
3	Torx screw, M4 × 8 pan head	5	8	End panel	2
4	Torx screw, M4 × 8 flat head	13	9	Extrusion - V-track, 597 mm	2
5	Side frame assembly	2			



Note: Depending on system configuration, you may have extra parts remaining after assembly.

Pipe clamp kit - ACAC11005

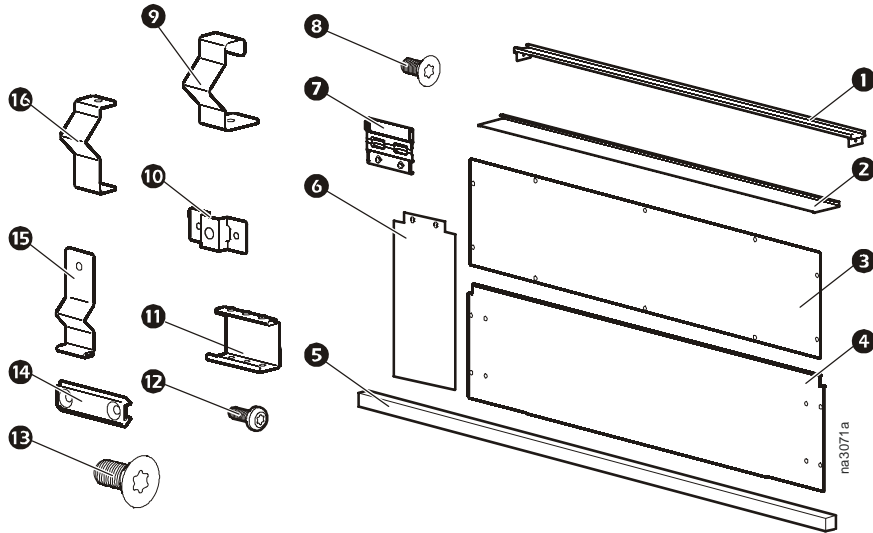


Item	Description	Qty	Item	Description	Qty
❶	Pipe clamp, 3.98 in - 4.53 in (return)	2	❷	3/8 in split lockwasher	4
❸	Pipe clamp, 2.60 in - 2.99 in (supply)	2	❹	Pipe support insulation 1 5/8 in × 2 in	2
			❺	Hex head bolt, 3/8 × 16 × 3/4	4
			❻	Pipe support insulation 3 1/8 in × 3 in	2



Note: Depending on system configuration, you may have extra parts remaining after assembly.

End cap kit - ACAC11006

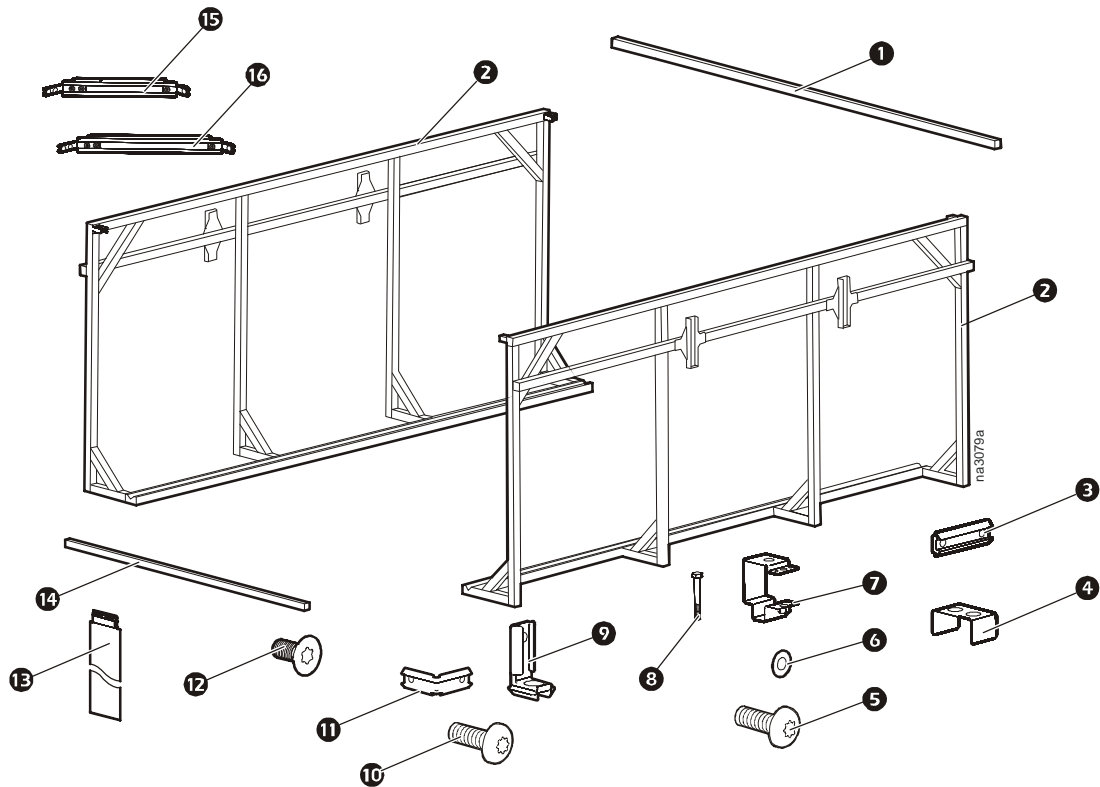


Item	Description	Qty	Item	Description	Qty
1	End of aisle ceiling containment, outside	1	9	Ceiling containment kit end stop clip	2
2	End of aisle ceiling containment, inside	2	10	Netbotz camera mounting clip	1
3	Ceiling containment assembly end panel	1	11	PDU rack mount bracket	4
4	Rack mount support end panel	1	12	Torx screw, M4 × 8 pan head	10
5	End of aisle curtain beam	1	13	Torx screw, M6-1 × 20 flat head	4
6	Vinyl air curtain - 190 mm × 300 mm	14	14	Connector, slide-in, 180 degrees	4
7	Air curtain clip	14	15	ACOA track end stop clip	2
8	Torx screw, M4 × 8 flat head	32	16	ACOA unit track end stop	2



Note: Depending on system configuration, you may have extra parts remaining after assembly.

InRow OA mount frame, 1800 mm (3-unit) - ACAC11007

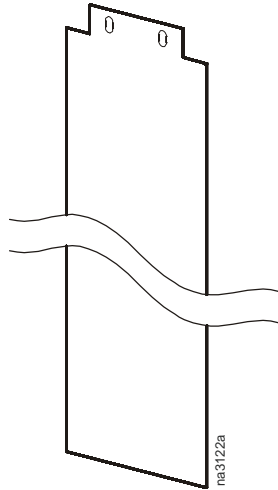


Item	Description	Qty	Item	Description	Qty
1	Upper cross rail, 1510 mm	2	9	Frame end connector, 25 mm	4
2	Side frame assembly, 1800 mm	2	10	Torx screw, M4 × 8 mm pan head	4
3	Frame slide-in splice connector, 25 mm	8	11	Frame corner connector, 25 mm	16
4	Frame joining clip	2	12	Torx screw, M4 × 8 flat head	88
5	Torx screw, M4 × 12 mm	4	13	Side air block strip assembly (190 mm × 300 mm)	28
6	Flat washer, M4	4	14	Cross-aisle beam, 1150 mm	4
7	Extrusion hanger bracket	4	15	Gusset, 190 mm	4
8	Hex bolt, M10 × 80 mm	4	16	Gusset, 250 mm	4



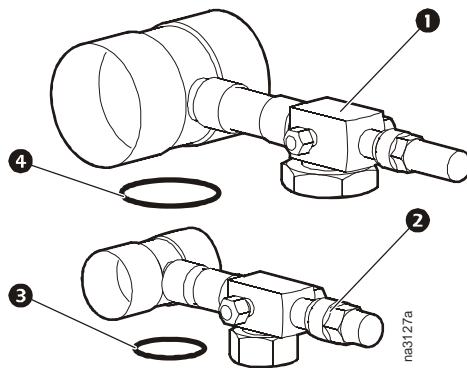
Note: Depending on system configuration, you may have extra parts remaining after assembly.

End aisle containment kit - ACAC11008 (42U) or ACAC11009 (48U)



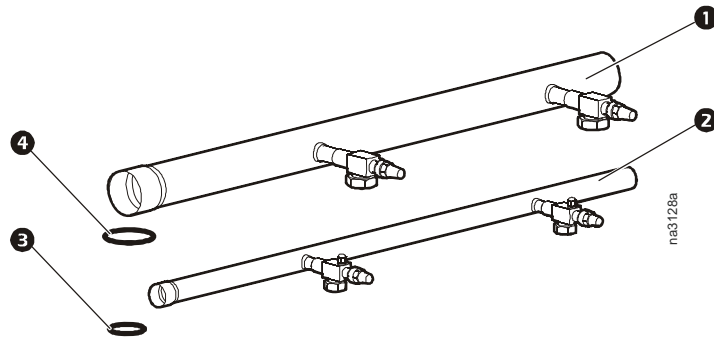
Description	Qty
Vinyl air curtain - 190 mm × 2228 mm (ACAC11008)	14
Vinyl air curtain - 190 mm × 2495 mm (ACAC11009)	14

RDU piping kit, one port - ACAC21000



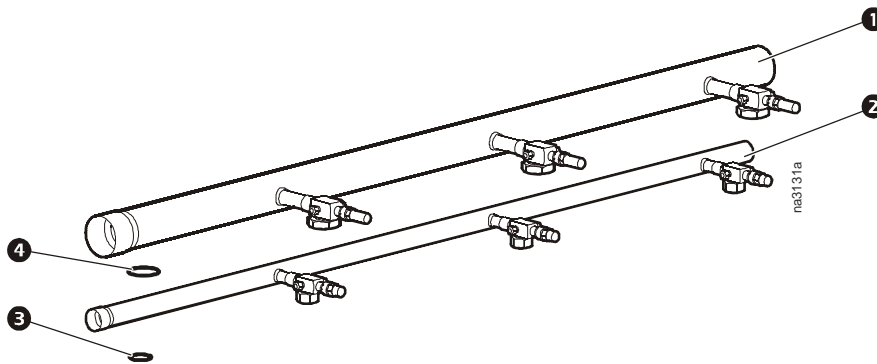
Item	Description	Qty	Item	Description	Qty
1	RDU 1 port assembly, return	1	3	Teflon ring for rotolock 1 1/4 in	2
2	RDU 1 port assembly, supply	1	4	Teflon ring for rotolock 1 3/4 in	2

RDU piping kit, two port - ACAC21002



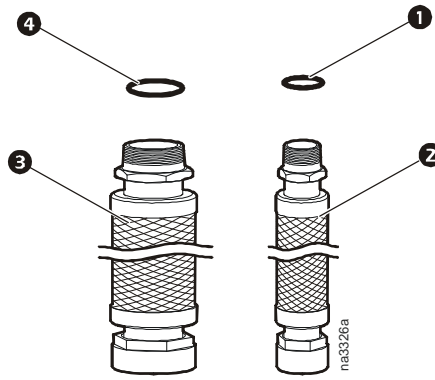
Item	Description	Qty	Item	Description	Qty
1	RDU 2 port assembly, return	1	3	Teflon ring for rotolock 1 1/4 in	4
2	RDU 2 port assembly, supply	1	4	Teflon ring for rotolock 1 3/4 in	4

RDU piping kit, three port - ACAC21004



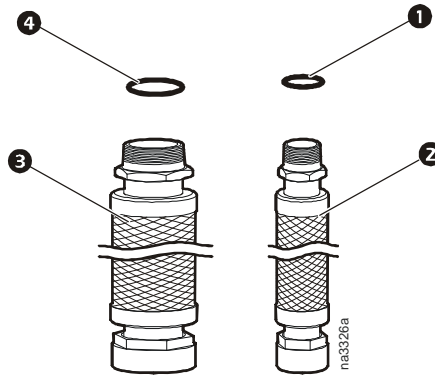
Item	Description	Qty	Item	Description	Qty
1	RDU 3 port assembly, return	1	3	Teflon ring for rotolock 1 1/4 in	6
2	RDU 3 port assembly, supply	1	4	Teflon ring for rotolock 1 3/4 in	6

914 mm (3 ft) stainless steel flex pipe kit - ACAC21007



Item	Description	Qty	Item	Description	Qty
1	Teflon ring, 1.25 in	1	3	Hose, 1.25 in OD, 914 mm (3 ft)	1
2	Hose, 1 in OD, 914 mm (3 ft)	1	4	Teflon ring, 1.75 in	1

1828 mm (6 ft) stainless steel flex pipe kit - ACAC21008



Item	Description	Qty	Item	Description	Qty
1	Teflon ring, 1.25 in	1	3	Hose, 1.25 in OD, 1828 mm (6 ft)	1
2	Hose, 1 in OD, 1828 mm (6 ft)	1	4	Teflon ring, 1.75 in	1

Determining Cooling Capacity

How to determine capacity of the InRow OA cooling unit:

IT equipment requires two acceptable limits in order for effective cooling to occur. These parameters are inlet air temperature and flow rate of air through the IT equipment. It is entirely possible, though undesirable, to design a computer room with enough heat removal capacity but with an inadequate volumetric flow rate of cool air supply. When this condition exists, IT equipment will be subjected to excessively high operating temperatures on a localized basis due to recirculation, and cooling equipment will operate at less than optimal efficiency. APC provides the necessary data to prevent this undesirable situation. The first table, titled “Recommended Capacity Limitations,” shows the capacity limits based on air flow of the InRow OA. The following tables, titled “Performance Specifications”, show the recommended maximum amount of load that should be placed upon the cooling unit solely based on heat removal capability. The lesser of the two capacity numbers obtained from the “Recommended Capacity Limitations” table and “Performance Specification” table should be considered the maximum load capable of being served by the InRow OA. A definition of the terms in these tables follows:

IT equipment air flow (l/s/kW) (cfm/kW)

The average cooling air flow rate demanded by IT equipment in liters per second (cubic feet per minute) divided by the total actual power dissipation of IT equipment in kilowatts.

Recommended capacity limit (kW)

The corresponding maximum load in kilowatts capable of being served by the cooling unit solely based on conservation of volumetric air flow.

DB (°F and °C)

The dry bulb temperature in degrees Fahrenheit and Celsius of the return air stream to the cooling unit.

WB (°F and °C)

The wet bulb temperature in degrees Fahrenheit and Celsius of the return air stream to the cooling unit.

CW delta T (°F and °C)

The difference in temperature in degrees Fahrenheit between chilled water entering and exiting the cooling unit.

Sensible net capacity (BTU/hr and kW)

The sensible net heat removal capacity of fan heat, of the cooling unit at stated operating conditions.

Total net capacity (BTU/hr and kW)

The total (sensible + latent) net heat removal capacity of fan heat, of the cooling unit at stated operating conditions.

Recommended Capacity Limitations

ACOA500

IT Equipment ΔT °C (°F)	IT Equipment Air Flow l/s per kW (cfm/kW)	Recommended Capacity Limit kW
11.0 (19.8)	75.5 (160)	19
11.3 (20.4)	73.2 (155)	20
11.7 (21.1)	70.8 (150)	20
12.1 (21.8)	68.4 (145)	21
12.5 (22.6)	66.1 (140)	22
13.0 (23.4)	63.7 (135)	22
13.5 (24.3)	61.4 (130)	23
14.1 (25.3)	59.0 (125)	24
14.6 (26.4)	56.6 (120)	25
15.3 (27.5)	54.3 (115)	26
15.9 (28.7)	51.9 (110)	28
16.7 (30.1)	49.6 (105)	29
17.5 (31.6)	47.2 (100)	31

ACOA501

IT Equipment ΔT °C (°F)	IT Equipment Air Flow l/s per kW (cfm/kW)	Recommended Capacity Limit kW
11.0 (19.8)	75.5 (160)	20
11.3 (20.4)	73.2 (155)	20
11.7 (21.1)	70.8 (150)	21
12.1 (21.8)	68.4 (145)	22
12.5 (22.6)	66.1 (140)	22
13.0 (23.4)	63.7 (135)	23
13.5 (24.3)	61.4 (130)	24
14.1 (25.3)	59.0 (125)	25
14.6 (26.4)	56.6 (120)	26
15.3 (27.5)	54.3 (115)	27
15.9 (28.7)	51.9 (110)	29
16.7 (30.1)	49.6 (105)	30
17.5 (31.6)	47.2 (100)	32

Performance Specifications

Performance Specifications 14.4°C (58°F) Evap Temperature

Return Air Conditions °C (°F)	ACOA500 Sensible Capacity * kW (BTU/hr)	ACOA501 Sensible Capacity ** kW (BTU/hr)
26.7 DB, 17.1 WB (80 DB, 62.8 WB)	13.2 (45,500)	13.6 (46,400)
29.4 DB, 18.1 WB (85 DB, 64.6 WB)	16.2 (55,300)	16.5 (56,300)
32.2 DB, 19.0 WB (90 DB, 66.2 WB)	19.0 (65,000)	19.4 (66,100)
35.0 DB, 19.9 WB (95 DB, 67.8 WB)	21.8 (74,400)	22.2 (75,700)
37.8 DB, 20.7 WB (100 DB, 69.3 WB)	24.5 (83,700)	25 (85,300)
40.6 DB, 21.6 WB (105 DB, 70.8 WB)	27.2 (92,800)	27.7 (94,500)
<p>Note: * All values are accurate to +/- 1 kW (3415 BTU/hr) and based on full airflow of 1463 l/s (3100 CFM)</p> <p>Note: ** All values are accurate to +/- 1 kW (3415 BTU/hr) and based on full airflow of 1510 l/s (3200 CFM)</p> <p>Note: Dewpoint must be 13.3°C (56°F) Or lower to achieve conditions listed in table.</p> <p>Note: Sensible Heat Ratio = 1</p> <p>Note: Must be connected to the RDU to ensure proper operation.</p>		

Performance at Percentage of Fan Speed

SKU: ACOA500

% Fan Speed	L/s (SCFM)	Unit Power (Watts)	Net Sensible Capacity kW (BTU/h)	SA Temp °C (°F)
Return Air Condition = 29.4° C DB, 18.1° C WB (85° F DB, 64.6° F WB)				
50	625.8 (1326)	127	8.9 (30,500)	17.7 (63.9)
60	840.5 (1781)	213	11.3 (38,700)	18.3 (65.0)
70	1025.5 (2173)	324	13.0 (44,300)	19.0 (66.2)
80	1191.2 (2524)	452	14.3 (48,700)	19.6 (67.2)
83*	1240.3 (2628)	492	14.6 (50,000)	19.7 (67.5)
90	1351.2 (2863)	622	15.4 (52,700)	20.0 (68.1)
92*	1372 (2907)	660	15.6 (53,200)	20.1 (68.2)
100	1463 (3100)	746	16.2 (55,300)	20.3 (68.6)
Return Air Condition = 35.0° C DB, 19.9° C WB (95° F DB, 67.8° F WB)				
50	625.8 (1326)	127	12.0 (41,000)	18.9 (66.0)
60	840.5 (1781)	213	15.2 (52,000)	19.8 (67.6)
70	1025.5 (2173)	324	17.5 (59,700)	20.7 (69.3)
80	1191.2 (2524)	452	19.2 (65,600)	21.5 (70.7)
83*	1240.3 (2628)	492	19.7 (70,900)	21.7 (71.0)
90	1351.2 (2863)	622	20.8 (70,900)	22.1 (71.8)
92*	1372 (2907)	660	21.0 (71,600)	22.2 (71.9)
100	1463 (3100)	746	21.8 (74,400)	22.5 (72.5)
Return Air Condition = 40.6° C DB, 21.6° C WB (105° F DB, 70.8° F WB)				
50	625.8 (1326)	127	15.0 (51,100)	20.1 (68.2)
60	840.5 (1781)	213	19.0 (64,900)	21.2 (70.2)
70	1025.5 (2173)	324	21.8 (74,400)	22.4 (72.3)
80	1191.2 (2524)	452	23.9 (81,700)	23.4 (74.1)
83*	1240.3 (2628)	492	24.5 (83,800)	23.6 (74.6)
90	1351.2 (2863)	622	25.9 (88,400)	24.2 (75.5)
92*	1372 (2907)	660	26.1 (89,200)	24.3 (75.7)
100	1463 (3100)	746	27.2 (92,800)	24.7 (76.4)
Note: * Fan speeds listed to show maximum performance for derate voltages.				

Voltage Derate Table

SKU: ACOA500

Input Voltage (V)	120	110	100
Max Fan Speed (%)	100	92	83

**Performance at Percentage of Fan Speed
SKU: ACOA501**

% Fan Speed	L/s (SCFM)	Unit Power (Watts)	Net Sensible Capacity kW (BTU/h)	SA Temp °C (°F)
Return Air Condition = 29.4° C DB, 18.1° C WB (85° F DB, 64.6° F WB)				
50	658.8 (1396)	149	9.3 (31,900)	17.8 (64)
60	852.8 (1807)	231	11.4 (39,100)	18.4 (65.1)
70	1060 (2246)	358	13.3 (45,300)	19.1 (66.4)
80	1232.3 (2611)	500	14.6 (49,800)	19.7 (67.5)
90	1412.5 (2993)	681	15.9 (54,200)	20.2 (68.4)
100	1510.2 (3200)	834	16.5 (56,300)	20.4 (68.8)
Return Air Condition = 35.0° C DB, 19.9° C WB (95° F DB, 67.8° F WB)				
50	658.8 (1396)	149	12.6 (42,900)	19 (66.2)
60	852.8 (1807)	231	15.4 (52,600)	19.8 (67.7)
70	1060 (2246)	358	17.8 (60,900)	20.9 (69.6)
80	1232.3 (2611)	500	19.6 (67,000)	21.6 (71)
90	1412.5 (2993)	681	21.3 (72,900)	22.3 (72.2)
100	1510.2 (3200)	834	22.2 (75,700)	22.7 (72.8)
Return Air Condition = 40.6° C DB, 21.6° C WB (105° F DB, 70.8° F WB)				
50	658.8 (1396)	149	15.6 (53,400)	20.3 (68.5)
60	852.8 (1807)	231	19.2 (65,600)	21.3 (70.4)
70	1060 (2246)	358	22.2 (76,000)	22.6 (72.7)
80	1232.3 (2611)	500	24.4 (83,500)	23.6 (74.5)
90	1412.5 (2993)	681	26.6 (90,800)	24.5 (76)
100	1510.2 (3200)	834	27.7 (94,500)	24.9 (76.8)
Note: * Fan speeds listed to show maximum performance for derate voltages.				

General Data

General Specifications

MODEL		ACOA500	ACOA501
AIR SYSTEM - FAN			
	Size - mm (in)	400 (15.7)	
	Air Volume - l/s (SCFM)	1463 (3100) *	1510 (3200)
	Fan Motor - W (HP) each	400 (0.5)	
	Number of fans	2	
COOLING COIL - ALUMINUM MICROCHANNEL			
	Face Area - m ² (ft ²)	0.7 (7.5)	
PHYSICAL DATA			
	Net Weight - kg (lbs)	57 (125.7)	
	Net Height - mm (in) (including tracks and rollers)	352.4 (13.9)	
	Net Width - mm (in)	598.0 (23.5)	
	Net Depth - mm (in) (without pipe stubs)	1312.5 (51.7)	
	Net Depth - mm (in) (with pipe stubs)	1415.6 (55.7)	
	Operating Weight - kg (lbs)	59.3 (130.7)	
CONNECTION SIZES			
	Inlet	1-1/4"-12 Rotolock	
	Outlet	1-3/4"-12 Rotolock	
REFRIGERANT			
	Type	R134a	
	Charge - kg (lb)	2.3 (5)	
ELECTRICAL			
	Input Power	100-120V/1/50/60 Hz	200-240V/1/50/60 Hz
Note: Maximum distance between the RDU and the farthest cooling module is 24.4 Equivalent meters (80 equivalent feet). * Voltage derate Maximum Airflow at 120V = 1463 l/s (3100 CFM) Maximum Airflow at 110V = 1372 l/s (2907 CFM) Maximum Airflow at 100V = 1240 l/s (2628 CFM)			



Altitude Correction Factors

Room Condition: 72F DB / 50%RH											
Altitude - m (ft)	0	305 (1,000)	610 (2,000)	915 (3,000)	1,219 (4,000)	1,524 (5,000)	1,829 (6,000)	2,134 (7,000)	2,438 (8,000)	2,743 (9,000)	3,048 (10,000)
Specific Volume m³/g (ft³/lb)	8.48 (13.58)	8.80 (14.09)	9.13 (14.62)	9.48 (15.18)	9.84 (15.76)	10.21 (16.36)	10.61 (17.00)	11.03 (17.67)	11.47 (18.37)	11.93 (19.11)	12.42 (19.89)
Density g/m³ (lb/ft³)	118.54 (0.074)	113.73 (0.071)	108.93 (0.068)	105.72 (0.066)	100.92 (0.063)	97.71 (0.061)	94.51 (0.059)	91.31 (0.057)	86.50 (0.054)	83.30 (0.052)	80.09 (0.05)
Density Ratio	1	0.964	0.929	0.895	0.862	0.83	0.799	0.769	0.739	0.711	0.683
Capacity Correction	1	0.981	0.962	0.933	0.913	0.884	0.865	0.846	0.826	0.807	0.787
Density ratio is used for air flow correction factor. Capacity correction is used to derate performance											

Sound Performance Data

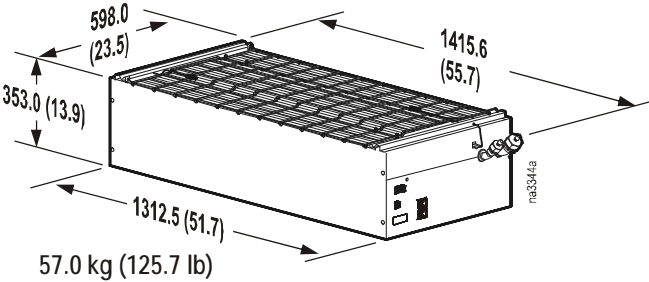
Fan Speed %	Fan RPM	Airflow l/s (SCFM)	Sound Power dB at Frequency Hz re: 10 ⁻¹² W								Lp Sound Pressure dB re: 20 μPa*
			125	250	500	1000	2000	4000	8000	dBA	dBA
100											
90											
80											
70											
60											
50											
40											
30											
* Weighted Sound Pressure dBA in a ??? m ³ (???? Ft ³) room at 1.0 m (3 ft) distance											

Electrical Data

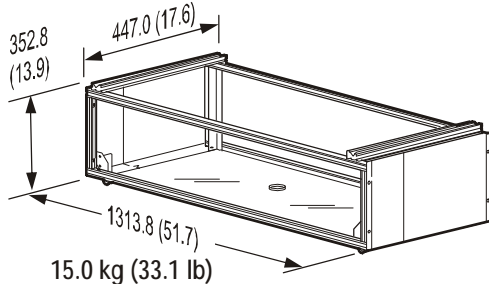
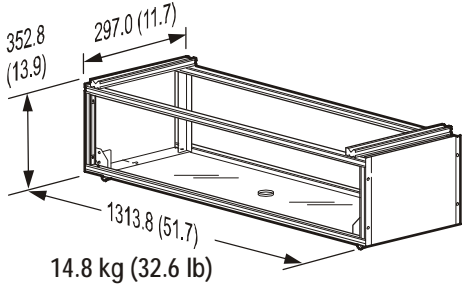
SKU	Power (Watts)	Plug Type
ACOA500 100-120V / 1 / 50/60 Hz	746 *	NEMA L5-20P 
ACOA501 200-240V / 1 / 50/60 Hz	834 *	IEC-309 16/20A 
<p>Note: Above data is based on maximum operating condition Note: Installation must comply with local and/or national electrical codes * Above data includes 24 Watts for the lighting</p>		

Dimensional Data

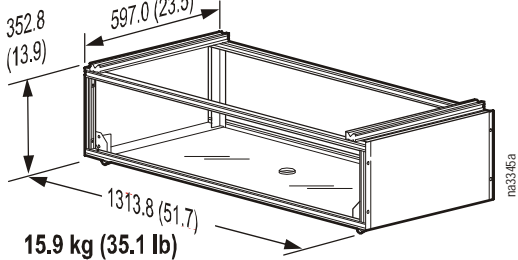
ACOA500/ACOA501



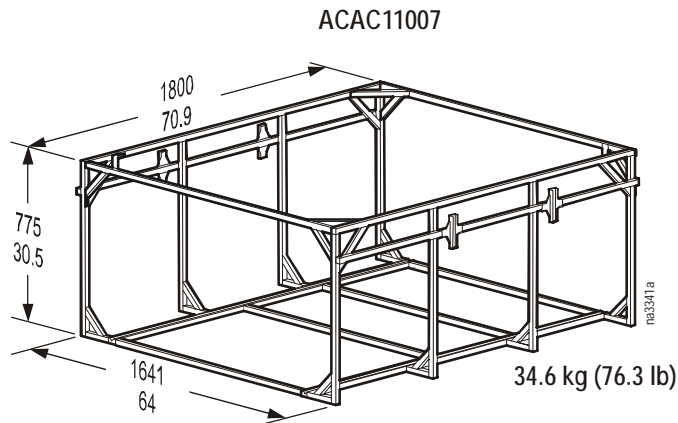
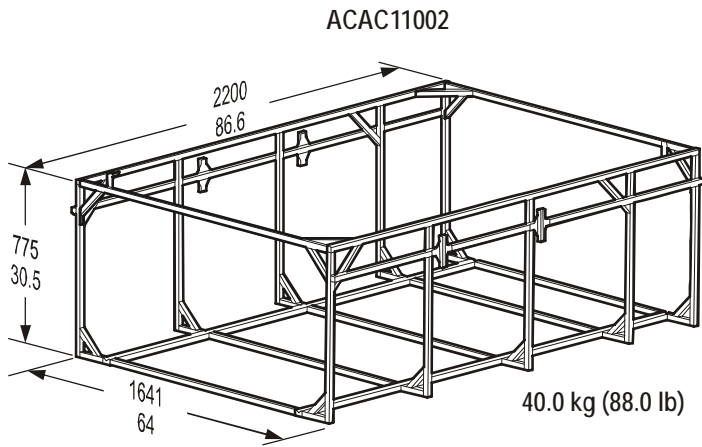
ACAC11003



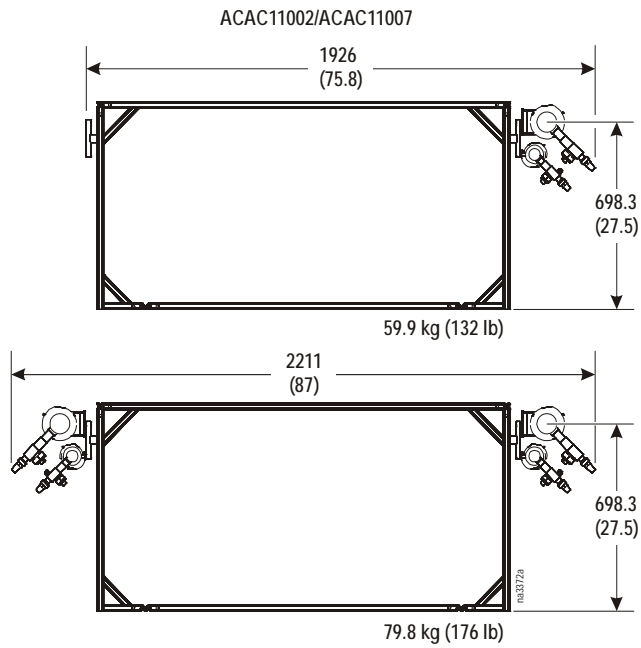
ACAC11004



Dimensions are shown in mm (in).

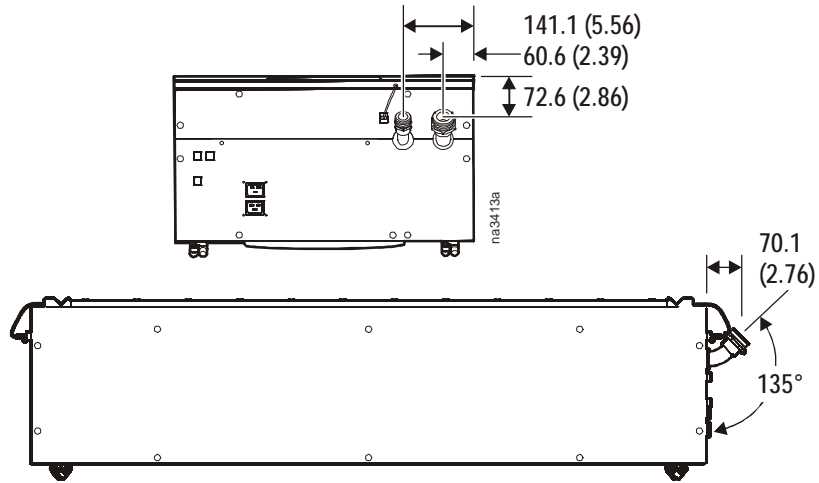


Dimensions are shown in mm (in), and include pipe mounting brackets.



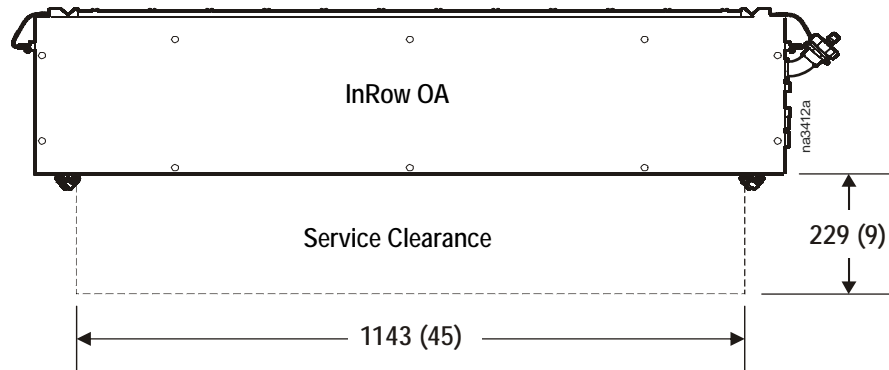
Dimensions are shown in mm (in).

Piping connection dimensions



Dimensions are shown in mm (in).

Service clearance



Dimensions are shown in mm (in).

Packed Weight and Dimensions

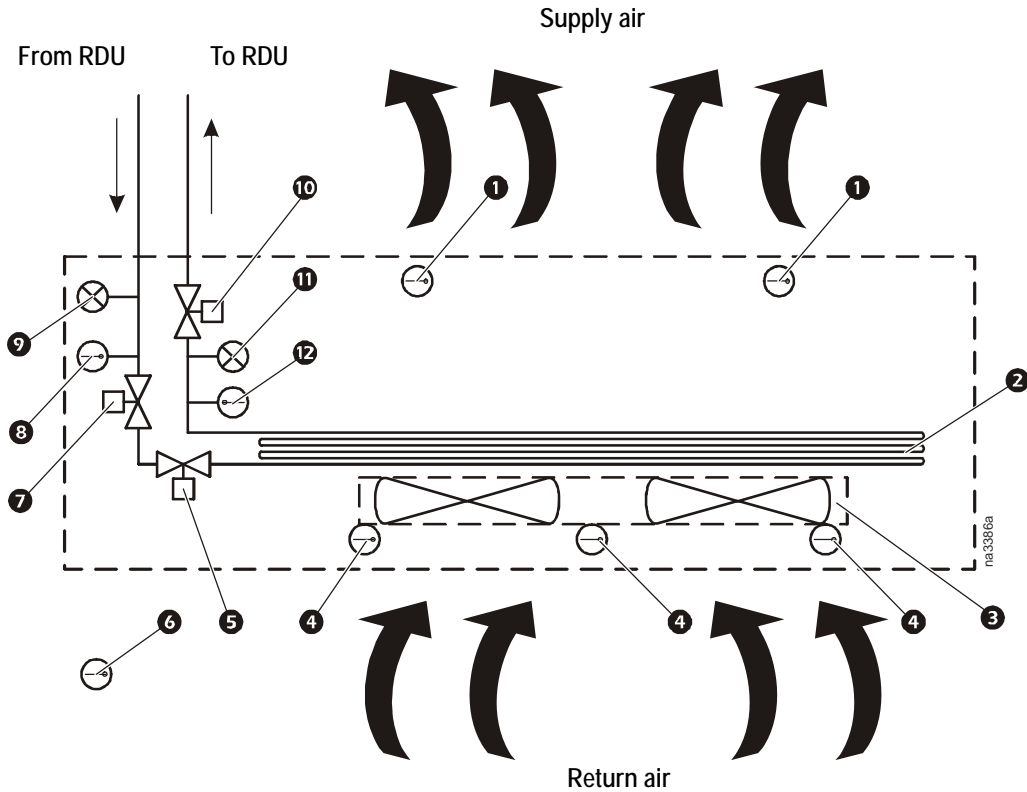
SKU	Description	Weight - kg (lb)	Dimensions - mm (in)		
			H	W	L
ACOA500, ACOA501	InRow OA	78.0 (172.0)	566.8 (22.3)	753.0 (29.6)	1561.2 (61.5)
ACAC11000	InRow OA rack mount kit	5.0 (11.0)	207.0 (8.1)	236.0 (9.3)	306.0 (12.0)
ACAC11002	InRow OA mount kit, 2200 mm (3 unit)	49.0 (108.0)	301.0 (11.9)	903.5 (35.6)	2303.5 (90.7)
ACAC11003	Ceiling containment kit, 300-450 mm	17.2 (37.9)	111.5 (4.4)	731.0 (28.8)	1506.0 (59.3)
ACAC11004	Ceiling containment kit, 600 mm	18.1 (39.9)	111.5 (4.4)	731.0 (28.8)	1506.0 (59.3)
ACAC11005	InRow OA pipe clamp kit	1.8 (4.0)	165.4 (6.5)	183.8 (7.2)	234.6 (9.2)
ACAC11006	InRow OA end cap kit	19.5 (43.0)	86.0 (3.4)	428.5 (16.9)	1436.0 (56.5)
ACAC11007	InRow OA mount kit, 1800 mm (3 unit)	42.6 (93.9)	301.0 (11.9)	903.5 (35.6)	1907.5 (75.1)
ACAC11008	InRow OA end aisle containment kit (42U)	12.2 (26.9)	229.0 (9.0)	364.0 (14.3)	364.0 (14.3)
ACAC11009	InRow OA end aisle containment kit (48U)	13.0 (28.7)	229.0 (9.0)	364.0 (14.3)	364.0 (14.3)



Note: For piping weights and dimension, see the RDU Technical Data Manual.

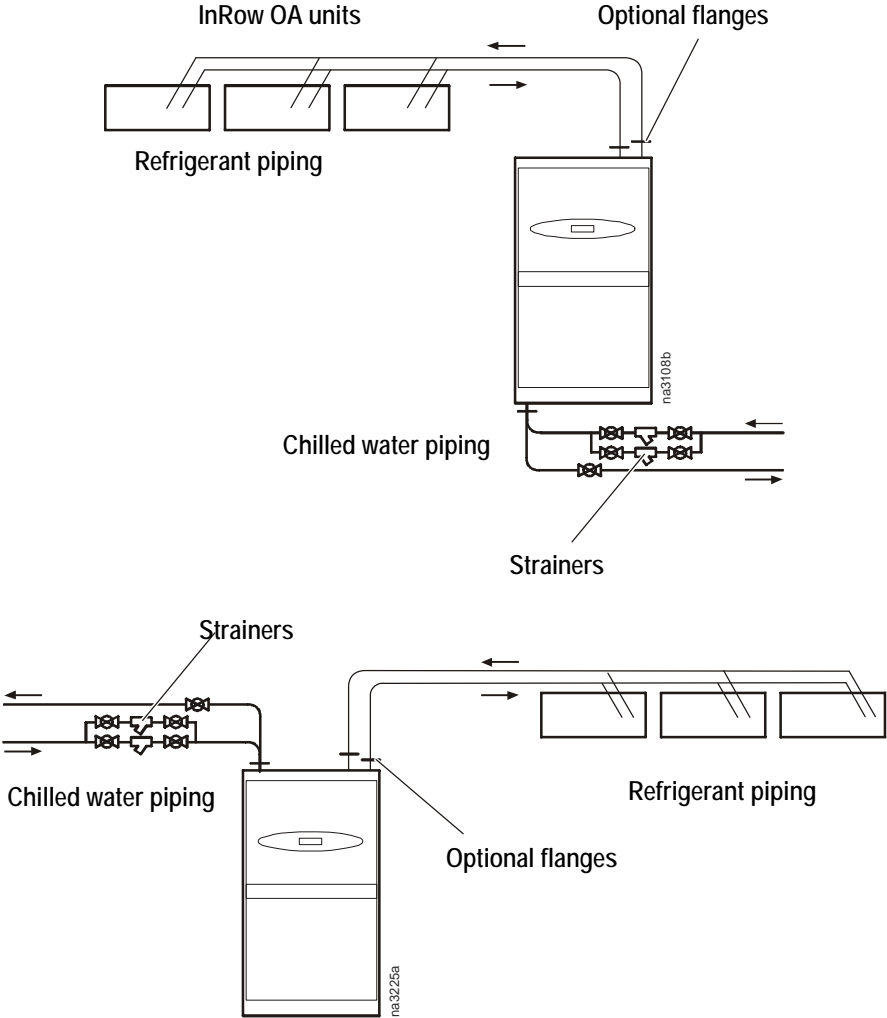
Piping and Mechanical Connections

Internal Piping



Item	Description	Item	Description
1	Supply air temperature sensors	7	Solenoid valve
2	Micro-channel coil	8	Supply liquid temperature sensor
3	Fans	9	Refrigerant liquid pressure sensor
4	Return air temperature sensors	10	Evaporator pressure regulator (EPR)
5	Electronic expansion valve (EEV)	11	Refrigerant vapor pressure sensor
6	Remote rack inlet temperature sensor	12	Return vapor temperature sensor

External Piping



Guide Specifications

PART 1 — GENERAL

1.01 STANDARD COMPONENTS

A. CABINET CONSTRUCTION

1. Exterior panels shall be minimum 16 gauge aluminum. Bottom exterior panels shall be 16 gauge perforated aluminum with 69.5% open free area, and equipped with a keyed lock to provide a means of securing access to the internal components of the unit.
2. The frame shall be constructed of extruded aluminum for maximum strength. All units shall provide full service from the bottom, allowing units to be placed above a hot aisle in a data center.
3. All exterior panels shall be powder coated for durability and attractive finish. Exterior frame and panel color shall have color values: L = 74.50, a = -.53, b = +8.20.
4. Units shall include rollers to allow ease of installation above the hot aisle.

B. VARIABLE SPEED DIRECT DRIVE MIXED FLOW AC FAN ASSEMBLY

1. Fan: The unit shall be configured for blow-through air pattern to provide uniform air flow over the entire face of the coil. Each unit shall include two 400 mm mixed flow direct drive AC axial fans. For the ACOA500, each fan assembly should be designed to provide 1550 CFM (731.5 l/s) for total unit airflow of 3100 CFM (1463.0 l/s). For the ACOA501, each fan assembly should be designed to provide 1600 CFM (755.1 l/s) for total unit airflow of 3200 CFM (1510.2 l/s).
2. Variable Speed Fans: Fans shall be variable speed capable of modulating from 50-100%. Fans shall soft-start to minimize in-rush current when starting.
3. Fan Protection: Each fan assembly shall consist of a plastic injection molded bezel with integral fan inlet cage type finger guard.
4. Operation and Service: The unit should be capable of operation in the event of a single fan failure. Fans shall be replaceable while the unit is in operation.
5. Fans must be replaceable without the use of tools.

C. MICROPROCESSOR CONTROLLER

1. Monitoring and Configuration: The master display shall allow monitoring and configuration of the air conditioning unit through a menu-based control. Functions include status reporting, set-up, and temperature setpoints. Four LEDs report the operational status of the connected air conditioning unit.

2. Alarms: The microprocessor controller shall activate a visible and audible alarm in the occurrence of the following events:
 - a. Internal communications fault
 - b. Cooling failure
 - c. Rack inlet high temperature
 - d. Rack inlet temperature sensor
 - e. Fan fault
 - f. Input power feed failure
 - g. Supply air high temperature
 - h. Return air high temperature
 - i. Group communications lost
 - j. Air filter service interval expired
 - k. Evaporation temperature below dewpoint
 - l. Fan 1 door open
 - m. Fan 1 fault
 - n. Fan 1 missing or wrong type
 - o. Fan 2 door open
 - p. Fan 2 fault
 - q. Fan 2 missing or wrong type
 - r. Fan 3 fault (RA only)
 - s. Fan 4 fault (RA only)
 - t. Fan 5 fault (RA only)
 - u. Fan type not configured
 - v. Liquid inlet pressure sensor fault
 - w. Liquid temperature sensor fault
 - x. Primary power source overvoltage
 - y. Rack temperature sensor fault
 - z. Rack temperature high violation
 - aa. RDU communication fault
 - ab. Return air temperature sensor fault (front)
 - ac. Return air temperature sensor fault (middle)
 - ad. Return air temperature sensor fault (rear)
 - ae. Secondary power source overvoltage
 - af. Supply air temperature sensor fault (front)
 - ag. Supply air temperature sensor fault (rear)
 - ah. Unit ID needs configuration
 - ai. Unit personality not configured
 - aj. Vapor outlet pressure sensor failure
 - ak. Evaporation temperature below dewpoint
 - al. Unit is in maintenance mode

D. COOLING COIL

1. Cooling coil shall be an aluminum micro-channel heat exchanger. Coil end supports shall be a minimum 14 gauge galvanized steel. Coil shall be rated for a maximum pressure of 200 psig (2757.9 kPa).
2. Connections shall be 1-1/4" - 12 rotolok for supply and 1-3/4" - 12 rotolok for return.

E. LIGHTS

Lighting shall be integrated into the bottom of the cooling unit. It shall be low energy consuming LED lighting that is controlled via a motion detection sensor on the bottom of the unit.

F. REMOTE TEMPERATURE SENSOR

Remote temperature sensor shall ship with the unit for placement in the field to provide control input based on rack inlet temperature.

1.02 ELECTRICAL REQUIREMENTS

A. POWER INPUT

1. Each cooling unit shall be either 100-120V-1ph-50/60Hz (ACOA500) or 200-240V-1ph-50/60Hz (ACOA501).
2. Each cooling unit is supplied with two of the appropriate power cords based on the model.
3. The power feed shall automatically switch from primary to secondary source in the event of a power failure.

PART 2 — INSTALLATION

2.01 (REFER TO INSTALLATION MANUAL FOR COMPLETE INSTRUCTIONS)

A. MOUNTING

1. Each cooling unit shall be either rack mounted or ceiling suspended.
2. Ceiling suspension and rack mounting shall utilize a track to allow the cooling units to be rolled into final position.
3. The cooling units shall only require access to one end of the hot aisle for the lifting of the unit in place.

B. PIPING CONNECTIONS

1. Piping connections shall be made in accordance with manufacturer's piping recommendations.

PART 3 — STARTUP

3.01 (REFER TO OPERATION / MAINTENANCE MANUALS FOR COMPLETE INSTRUCTIONS)

A. STARTUP

1. Startup the air conditioning units in accordance with the manufacturer's startup instructions.
2. Test controls to demonstrate compliance with requirements.

Guidelines for Installation

The InRow OA uses cooled refrigerant to provide low temperature air which achieves reliable, accurate temperature control of computer rooms, laboratories, and other environments that require close tolerance control. The unit incorporates the latest system design innovations to provide you with optimum efficiency, reliability, and accuracy of control.

The InRow OA unit will provide years of trouble-free service when installed and maintained by technically qualified personnel. For more detailed information, see the appropriate InRow OA Installation manual.

Room preparation

During the design of the room, consideration should be given to the following factors: ease of entry for the system, floor-loading factors, and accessibility of piping and wiring.

The room must be sealed with a vapor barrier to minimize moisture infiltration. Polyethylene film (plastic sheeting) is a good vapor barrier for ceiling and wall applications. Rubber- or plastic-based paints should be applied to concrete floors and walls. The room should be thoroughly insulated to minimize thermal loads and make-up air (if required) should be preconditioned to reduce additional temperature, filtration, and moisture loads.

Service access

Routine service while in a row may be performed from below the unit.

Receiving the unit

Your InRow OA has been completely tested and inspected prior to shipment. To ensure that you have received the unit in excellent condition, perform a careful inspection of the crating and the unit immediately upon receipt. Verify that all parts ordered were received as specified. Report any damage discovered to the freight carrier. If necessary, contact the APC field service department for help in repairing or replacing damaged parts. While APC is not responsible for damage incurred in transit, we want to make sure that you have no undue delays in your system start-up. See the unpacking sheet and installation manual for more information.

Rigging

As with all electrical and mechanical equipment, you must take care with proper rigging of your unit. Do not use piping for lifting or moving. When using a forklift to move the unit, use the shipping skid to protect the bottom of the unit. Four threaded 3/8" X 16 holes are provided in the top of the frame to accommodate lifting eye bolts that can be utilized to lift the unit.

Aisle width

Because of the possible differences in equipment rack sizes, the width of the aisle between the rows of racks can vary from one installation to another. The most important consideration is that the maximum distance (D) between the centerline of the InRow OA mount kit and the equipment is 610 mm (24 in) as shown.

The drawing shows two possible examples of how equipment racks may be configured. Example 1 shows a shallow rack, which forces the rest of that half of the aisle to be narrower than the other half. Example 2 shows shallow racks on opposite sides of the aisle, resulting in equal widths of both halves of the aisle.

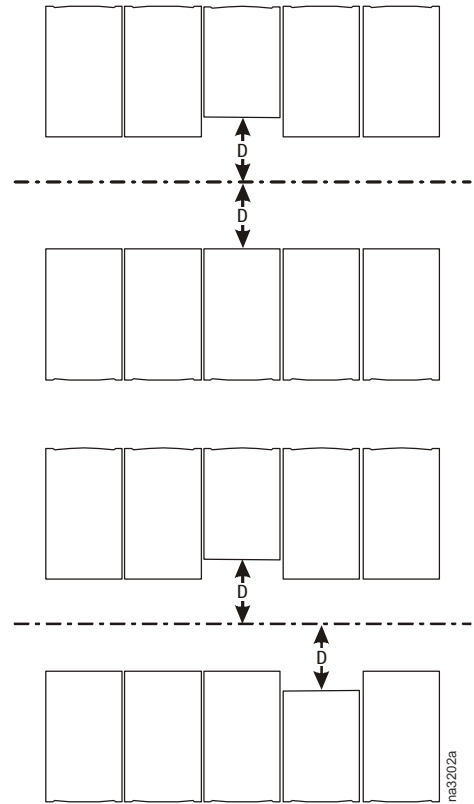
In an on-rack installation configuration, all equipment racks must be leveled and secured in position (and to each other) before installing the InRow OA mount kits.

Height clearance

Proper installation of the InRow OA mount kits requires at least 1100 mm (43.3 in) vertical space above the highest point of the equipment racks (including any height adapters).

Data center room volume requirements

Ensure the data center has sufficient interior volume to allow personnel to respond to any potential exposure to refrigerant (approximately 16 pounds per 1,000 ft³ in accordance with ASHRAE Standard 15-2001).



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 the APC Customer Support Center by telephone or e-mail.
 - Local, country-specific centers: go to **www.apc.com/support/contact** for contact information.

For information on how to obtain local customer support, contact the APC representative or other distributors from whom you purchased your APC product.

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