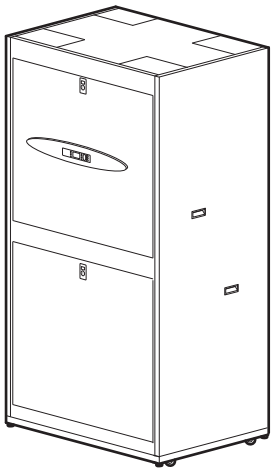
APC
by Schneider Electric

Installation

Refrigerant Distribution Unit (RDU)

ACDA901



This manual is available in English on the enclosed CD.

Dieses Handbuch ist in Deutsch auf der beiliegenden CD-ROM verfügbar.

Deze handleiding staat in het Nederlands op de bijgevoegde cd.

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

Ce manuel est disponible en français sur le CD-ROM ci-inclus.

Questo manuale è disponibile in italiano nel CD-ROM allegato.

本マニュアルの日本語版は同梱の CD-ROM からご覧になれます。

Instrukcja Obsługi w jezyku polskim jest dostepna na CD.

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

Данное руководство на русском языке имеется на прилагаемом компакт-диске.

您可以从包含的 CD 上获得本手册的中文版本。

您可以从付属的ＣＤ上获得本手册的中文版本。

동봉된 CD 안에 한국어 매뉴얼이 있습니다 .

Contents

General Information

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. See the back cover of this manual for the part number.

Operating ambient

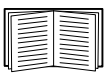
The operating ambient for the RDU is 10° C - 41° C (50° F - 105° F).

General symbols that may be used in this manual

Discard indicated part or assembly.

Do not discard indicated part or assembly.

Cross-reference symbol used in this manual



See another section of this document or another document for more information on this subject.

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.

Safety

Warning: Ensure that a readily-accessible disconnect device is installed (in accordance with local and national codes) near the installation site.

Note: All work should be performed by American Power Conversion (APC®) authorized personnel only. Follow all local and national codes and regulations when installing this equipment.

Caution: Keep your hands, clothing, and jewelry away from moving parts. Check the equipment for foreign objects before closing the doors and starting the equipment.

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

Tip Hazard: This equipment has a high center-of-gravity. Use extreme caution when unpacking and moving. 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 when the equipment is hard-wired.

Electrical Hazard: Do not wear jewelry when working near energized components.

Inspecting the Equipment

Your APC Refrigeration Distribution Unit (RDU) has been tested and inspected for quality assurance before shipment from APC. Carefully inspect both the exterior and interior of the equipment immediately upon receipt to ensure that the equipment has not been damaged during transit.

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

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 Worldwide Customer Support at one of the numbers on the website for information on how to file a claim with the shipping company. The shipping claim must be filed at the receiving end of the delivery.

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

Storing the Equipment Before Installation

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

Caution: Leaving the equipment uncovered and exposed to possible damage from the environment will void the factory warranty.

Moving the Equipment

Moving the equipment to its final location

The recommended tools for moving the equipment **while it is still on the pallet** includes the following:

Pallet jack Forklift

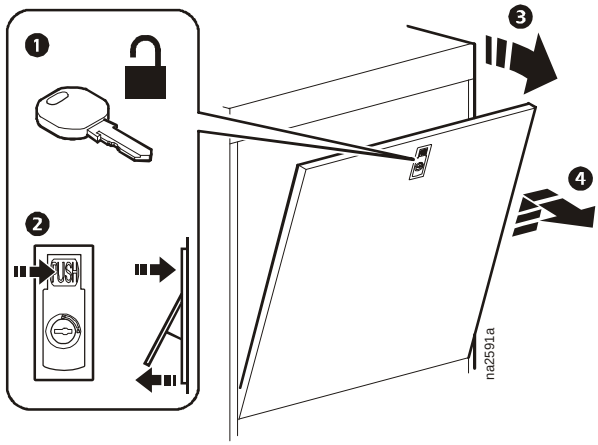
Note: The equipment can be rolled to its final location using its casters if the floor is smooth and clean.

Removing the Panels

Front panel removal

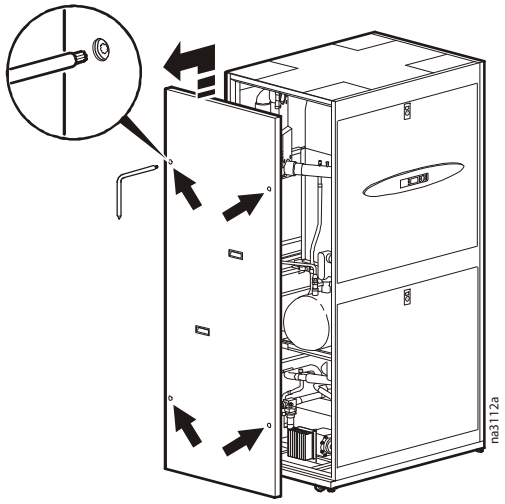
Note: The front panels of the RDU are locked. Remove a key from the hardware bag to access items shipped inside.

1. Unlock the latch.
2. Push latch down to release the panel from the cabinet.
3. Open the panel out and down.
4. Lift the panel out of the cabinet.



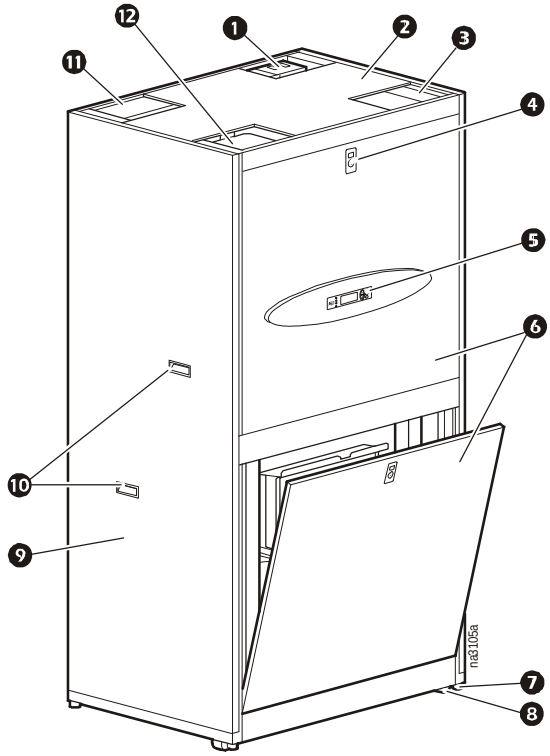
Side panel removal

1. Loosen four T-30 screws as shown.
2. Lift the panel off the cabinet.



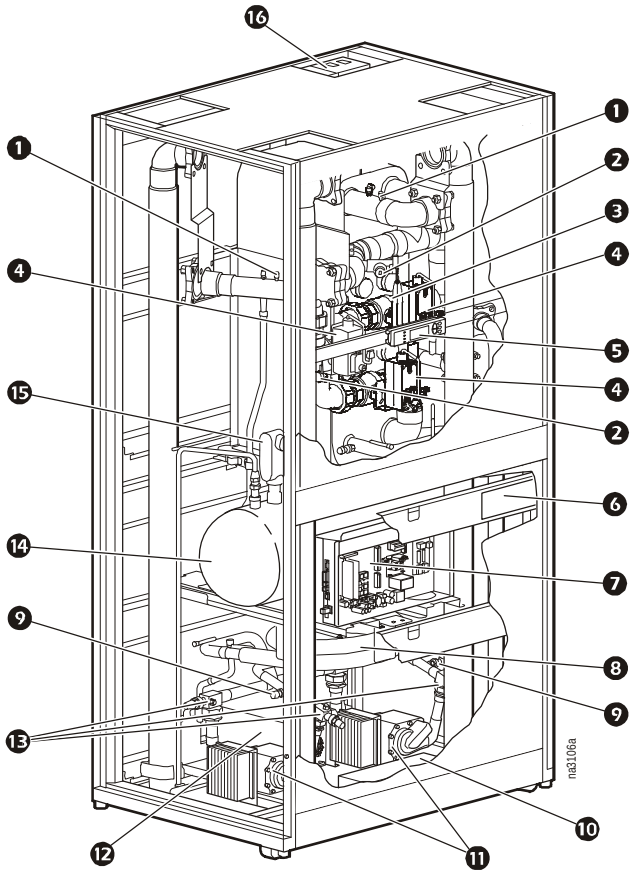
Component Identification

Exterior

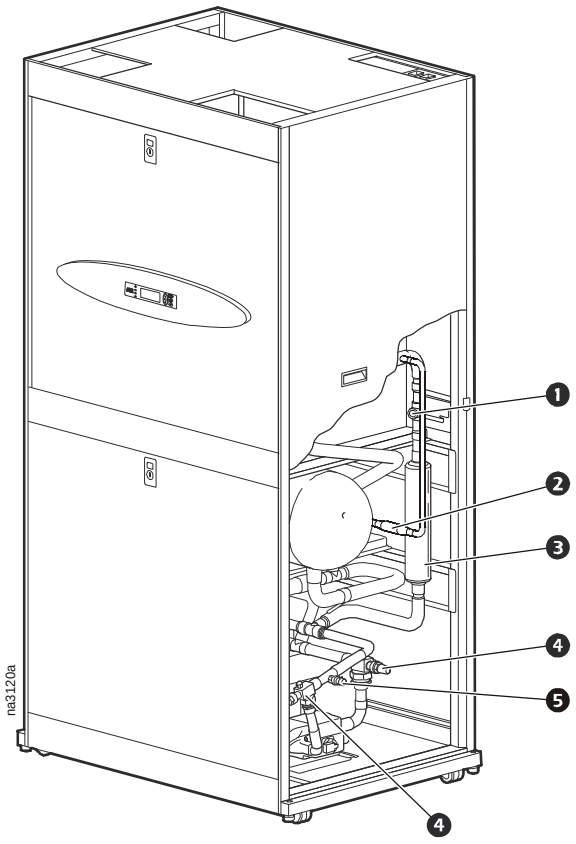


Item	Description	Item	Description
❶	Electrical connections (top or bottom configurable)	❼	Leveling feet
❷	Top panel	❽	Casters
❸	Refrigerant supply and return lines (top or bottom configurable)	❾	Side panel
❹	Panel lock	❿	Panel removal handles
❺	User interface	⓫	Chilled water inlet (top or bottom configurable)
❻	Locking panels	⓬	Chilled water outlet (top or bottom configurable)

Interior

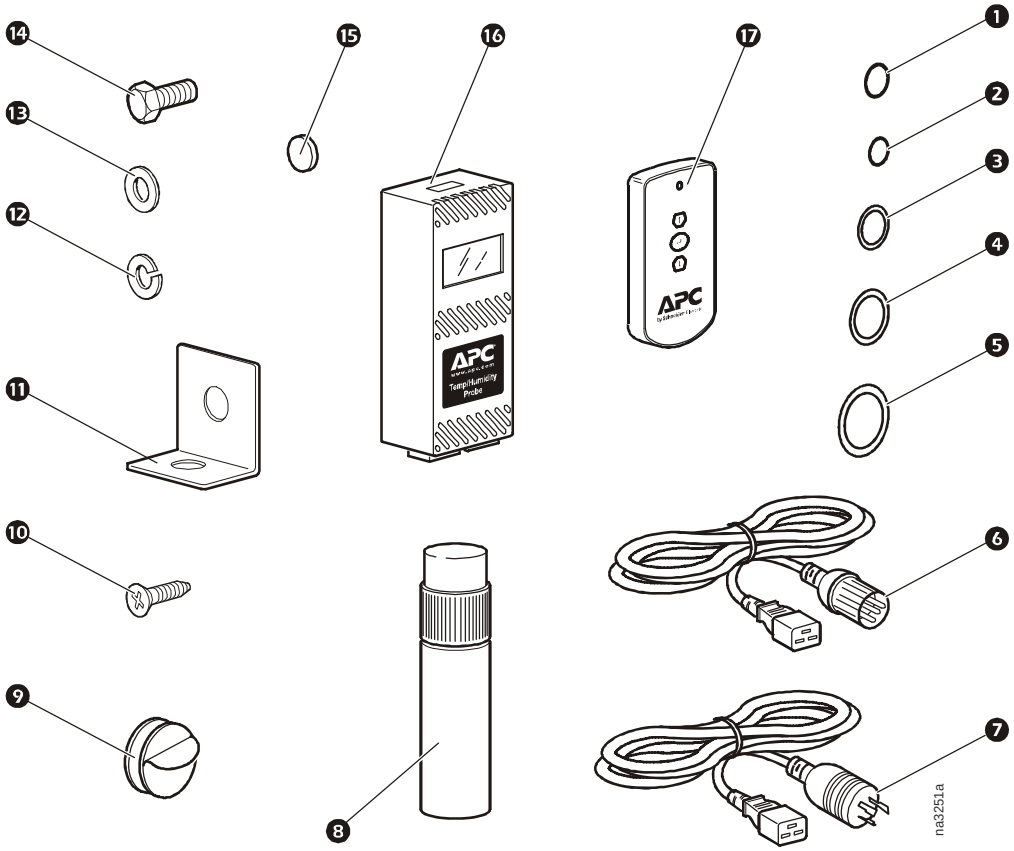


Item	Description	Item	Description
❶	Schrader® valve	❾	Pressure transducer
❷	Clean out tee	❿	Drip shield
❸	Brazed plate heat exchanger	⓫	Refrigerant pumps
❹	Actuator	⓬	Power supply housing
❺	Display interface	⓭	Rotolock valves
❻	Nameplate	⓮	Receiver
❼	Electronics board	⓯	Liquid level sensor
❽	Subcooler	⓰	Electrical receptacles



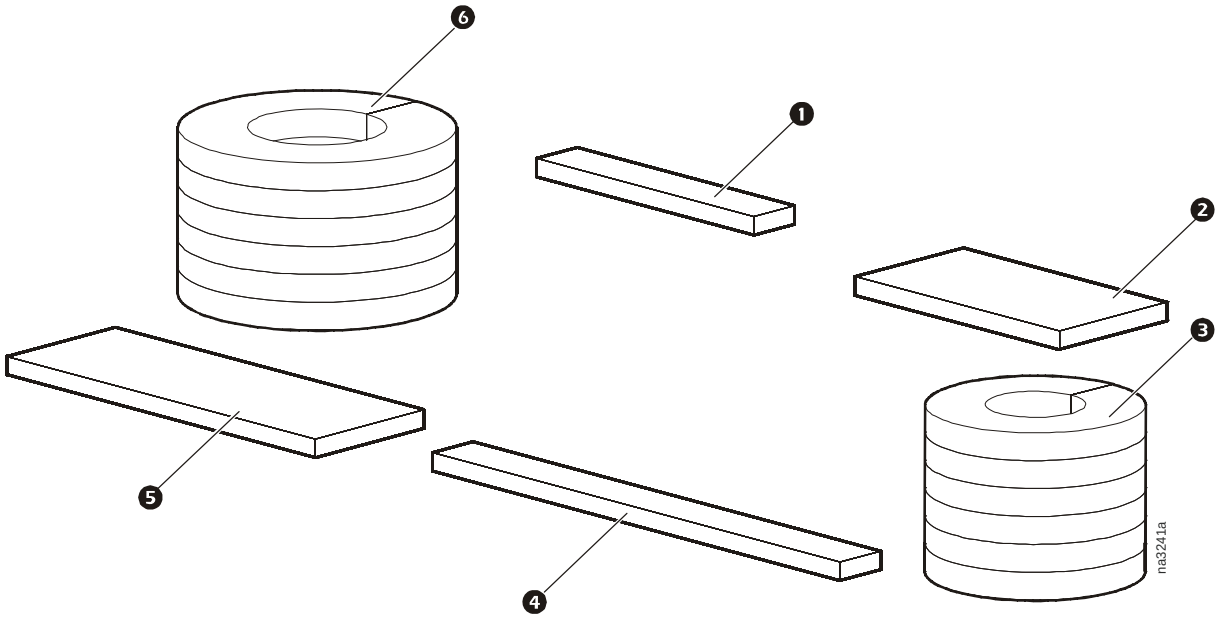
Item	Description
1	Sight glass
2	Open on rise of differential pressure (ORD) valve
3	Filter drier
4	Rotolock valve
5	Pressure transducer

Loose parts kit



Item	Description	Qty	Item	Description	Qty
❶	Teflon ring, 1-3/4 in (for rotolock valves)	2	❿	Philips screw	2
❷	Teflon ring, 1-1/4 in (for rotolock valves)	2	⓫	Mounting bracket	4
❸	Gasket, 1-5/8 in flange (for refrigerant supply line)	1	⓬	Lock washer	4
❹	Gasket, 2-in union (for internal water valves)	4	⓭	Washer	4
❺	Gasket, 2-5/8 in flange (for refrigerant return and chilled water inlet and outlet lines)	3	⓮	Bolt	4
❻	Power cord, IEC 309	2	⓯	Magnets for remote control mount	2
❼	Power cord, L5-20P	2	⓰	Temperature and humidity sensor	1
❽	Touch-up paint	1	⓱	Infrared remote control	1
❾	Hook and loop fastener	2			

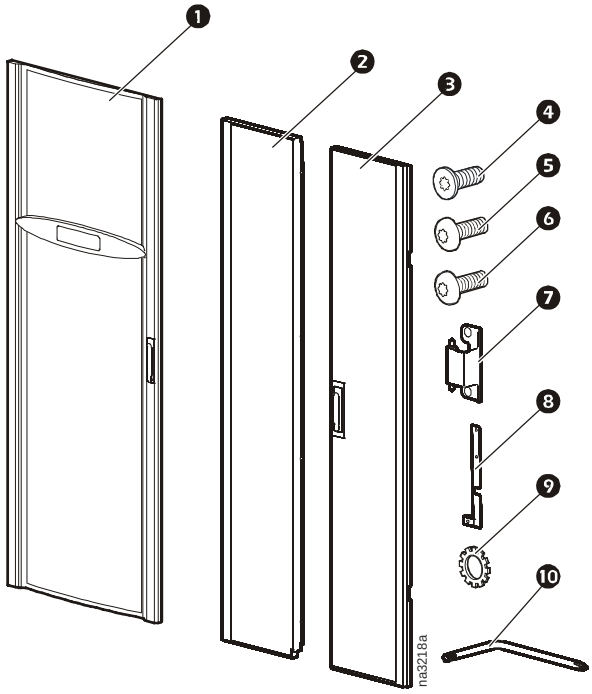
Insulation kit



Item	Description	Qty	Item	Description	Qty
❶	Inside cover, 1.5 in pipe clamp insulation	2	❹	Inside cover, 3 in pipe clamp insulation	5
❷	Cover, 1.5 in pipe clamp insulation	2	❺	Cover, 3 in pipe clamp insulation	5
❸	Flange boot, 1.62 in ID	1	❻	Flange boot, 2.62 in ID	3

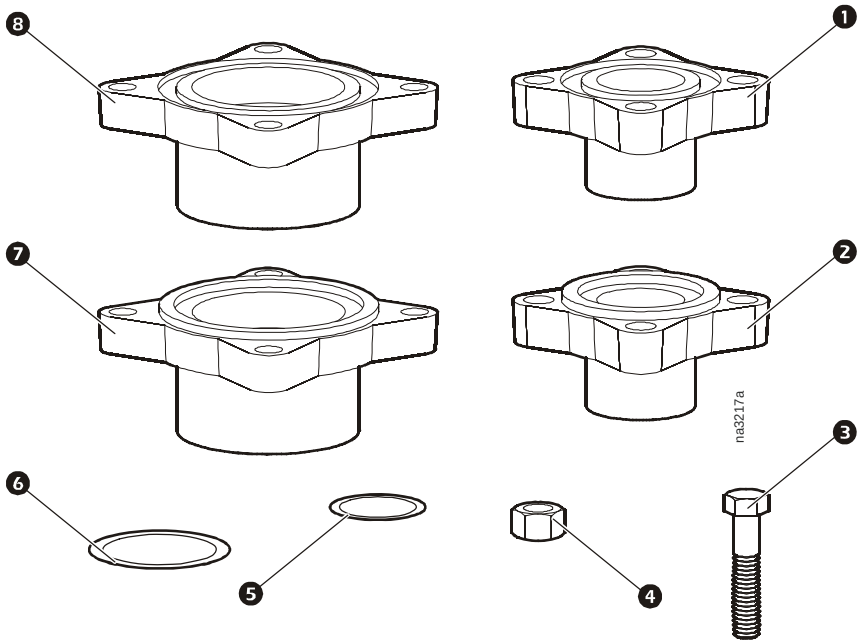
Optional kits

Rack door kit - ACAC21005



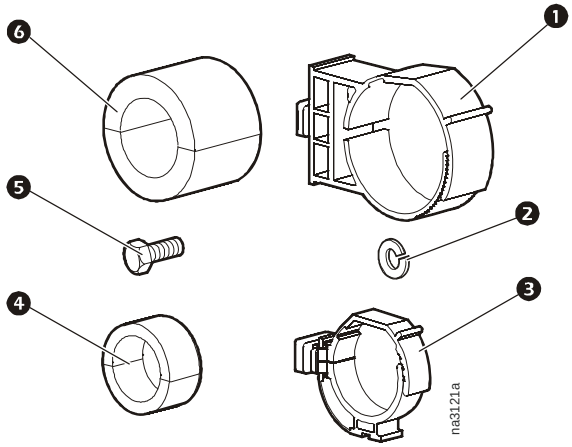
Item	Description	Qty	Item	Description	Qty
❶	Door assembly	1	❻	Screw, T30 M6 × 12 pan head	3
❷	Door assembly, left, split	1	❼	Hinge	6
❸	Door assembly, right, split	1	❽	Closure bracket	1
❹	Screw, T30 M6 × 12 flat head	12	❾	Washer, M6 external tooth	3
❺	Screw, T30 M6 × 12 nylok pan head	2	❿	Wrench, T30 / #2 Philips	1

Flange kit - ACAC21006



Item	Description	Qty	Item	Description	Qty
❶	Flange, 1.625 in OD female	1	❺	Gasket, 1-5/8 in flange	1
❷	Flange, 1.625 in OD male	1	❻	Gasket, 3-1/8 in flange	1
❸	Bolt	8	❼	Flange, 3.125 in OD male	1
❹	Nut	8	❽	Flange, 3.125 in OD female	1

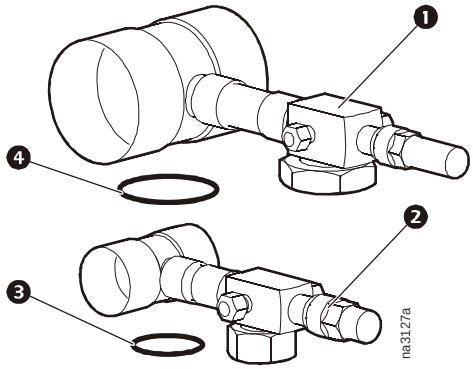
Pipe clamp kit - ACAC11005



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

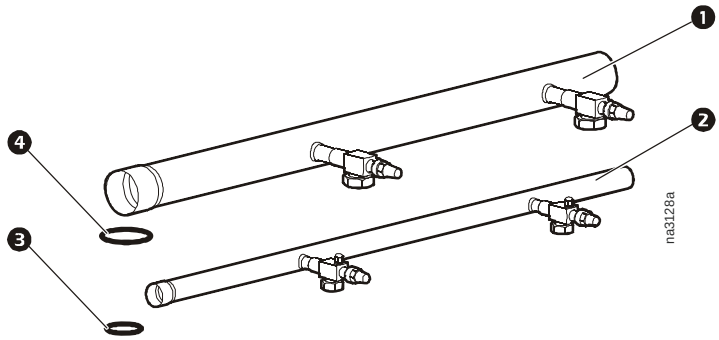
Note: Depending on system configuration, you may have extra parts remaining after assembly.

RDU piping kit, one port - ACAC21000



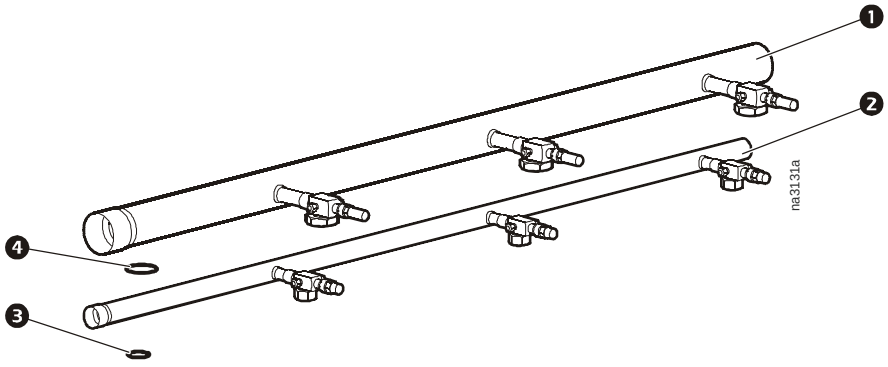
Item	Description	Qty	Item	Description	Qty
1	RDU 1 port assembly, return	1	3	Teflon ring for rotolock 1 1/4 in	2
2	RDU 1 port assembly, supply	1	4	Teflon ring for rotolock 1 3/4 in	2

RDU piping kit, two port - ACAC21002



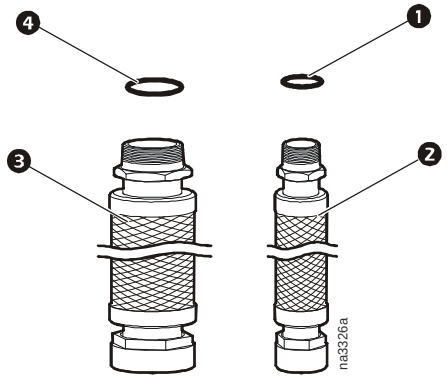
Item	Description	Qty	Item	Description	Qty
1	RDU 2 port assembly, return	1	3	Teflon ring for rotolock 1 1/4 in	4
2	RDU 2 port assembly, supply	1	4	Teflon ring for rotolock 1 3/4 in	4

RDU piping kit, three port - ACAC21004



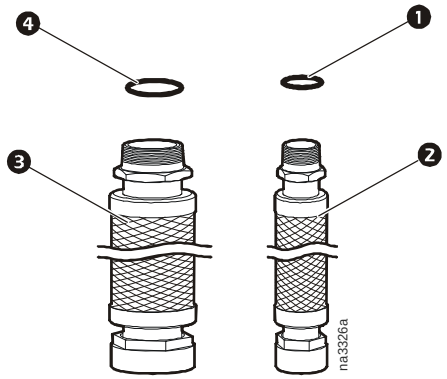
Item	Description	Qty	Item	Description	Qty
1	RDU 3 port assembly, return	1	3	Teflon ring for rotolock 1 1/4 in	6
2	RDU 3 port assembly, supply	1	4	Teflon ring for rotolock 1 3/4 in	6

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



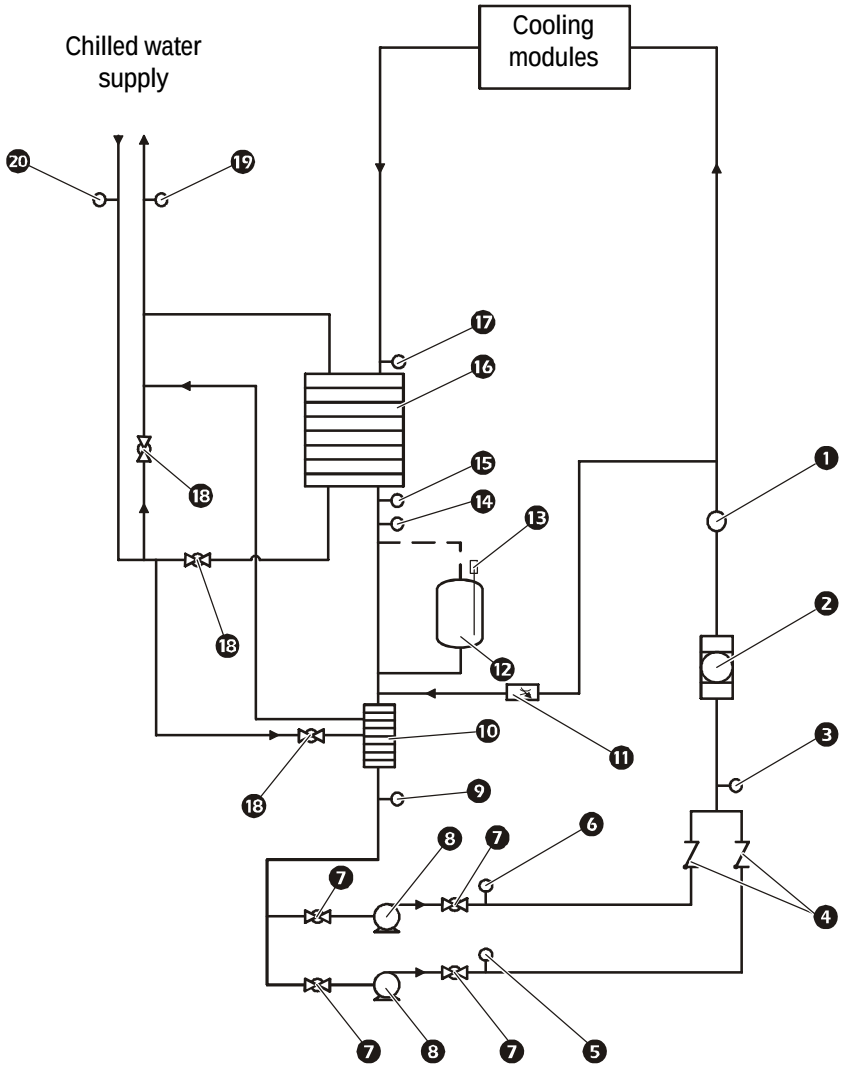
Item	Description	Qty	Item	Description	Qty
❶	Teflon ring, 1.25 in	1	❸	Hose, 1.25 in OD, 914 mm (3 ft)	1
❷	Hose, 1 in OD, 914 mm (3 ft)	1	❹	Teflon ring, 1.75 in	1

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



Item	Description	Qty	Item	Description	Qty
❶	Teflon ring, 1.25 in	1	❸	Hose, 1.25 in OD, 1828 mm (6 ft)	1
❷	Hose, 1 in OD, 1828 mm (6 ft)	1	❹	Teflon ring, 1.75 in	1

Internal Piping Diagram



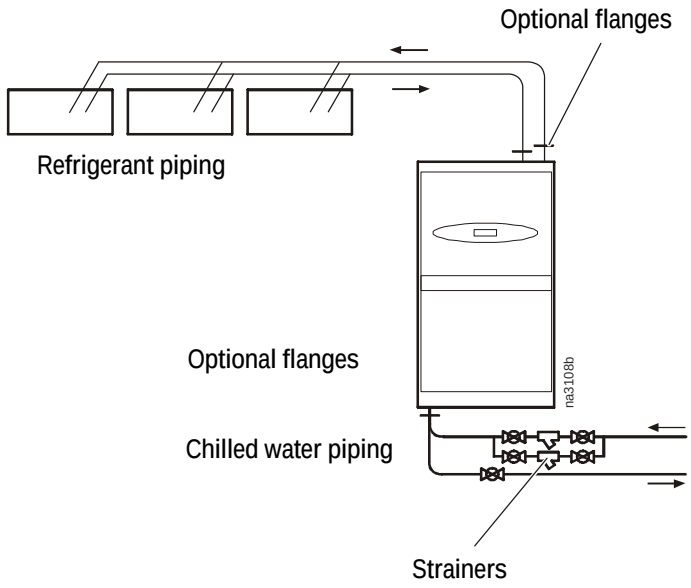
Item	Description	Item	Description
❶	Sight glass	⓫	ORD valve
❷	Filter dryer	⓬	Receiver
❸	Refrigerant pump output temperature sensor	⓭	Liquid level sensor
❹	Check valves	⓮	Refrigerant HXGR output temperature sensor
❺	Refrigerant pump B output temperature sensor	⓯	Refrigerant HXGR output pressure sensor
❻	Refrigerant pump A output temperature sensor	⓰	Condenser
❼	Isolation valves	⓱	Refrigerant HXGR input temperature sensor
❽	Pumps	⓲	Two-way water ball valves
❾	Refrigerant subcooler output temperature sensor	⓳	Leaving water temperature sensor
❿	Subcooler	⓴	Entering water temperature sensor

Piping Interconnect Diagrams

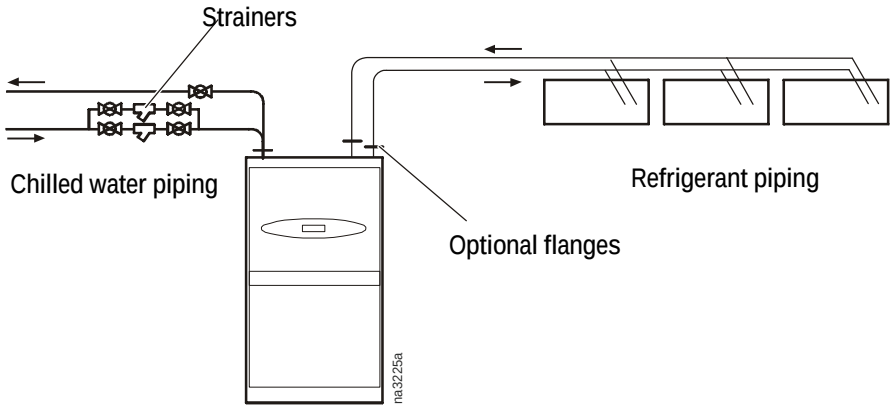
Note: Piping manifolds are available. All other valves, piping, etc. are customer-supplied. Use a 20 mesh stainless steel strainer with an opening size of 865 microns in the chilled water piping. Damage due to improper filtration will not be covered under warranty.

InRow OA units

This example shows an RDU with bottom piped chilled water lines and top piped refrigerant lines routed to multiple InRow InRow OA units.

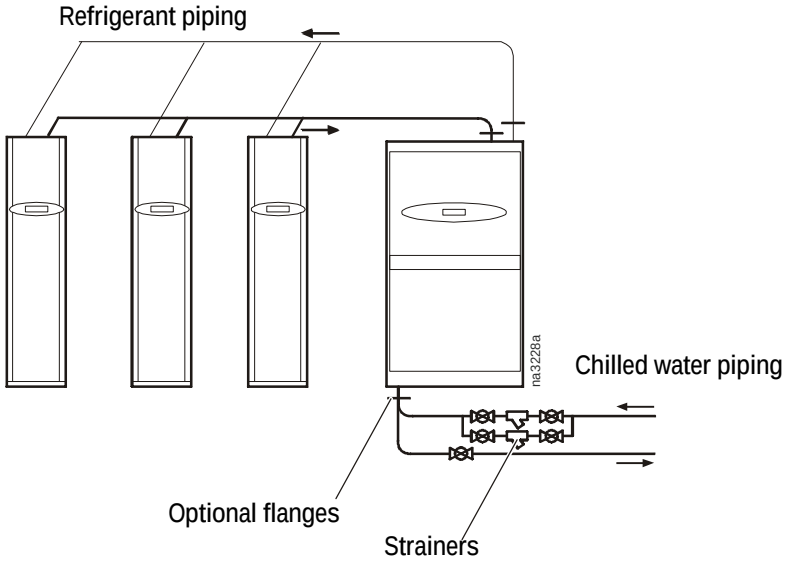


This example shows an RDU with both top piped chilled water lines and top piped refrigerant lines routed to multiple InRow OA units.

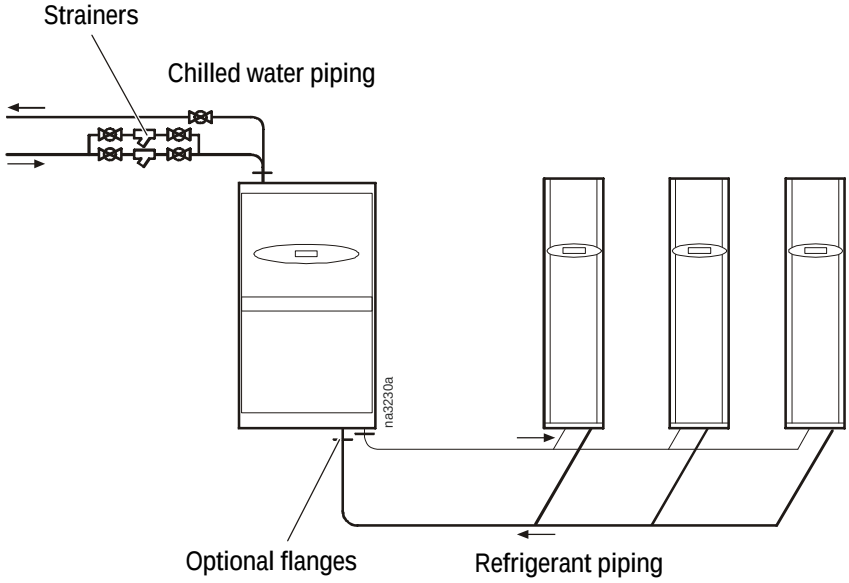


InRow RA units

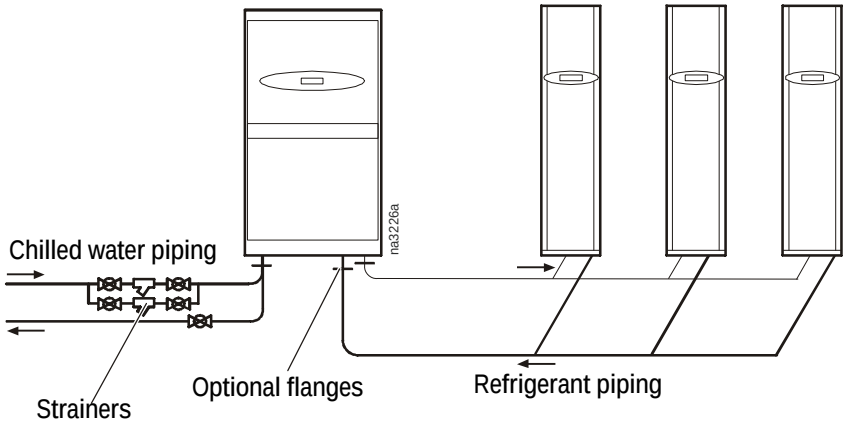
This example shows an RDU with bottom piped chilled water lines and top piped refrigerant lines routed to multiple InRow RA units.



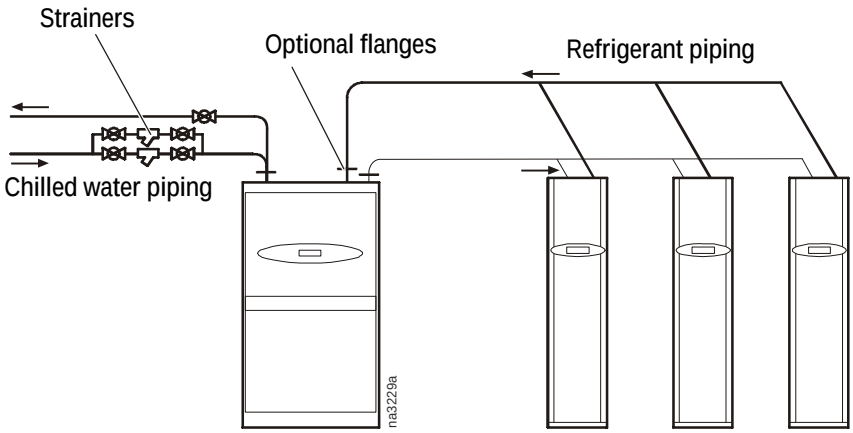
This example shows an RDU with top piped chilled water lines and bottom piped refrigerant lines routed to multiple InRow RA units.



This example shows an RDU with both bottom piped chilled water lines and bottom piped refrigerant lines routed to multiple InRow RA units.



This example shows an RDU with both top piped chilled water lines and top piped refrigerant lines routed to multiple InRow RA units.



Pre-Installation

Location

The RDU can be located at the end of a row of racks, elsewhere in the data center, or in a remote location within a one-way trip of 24.4 equivalent piping meters (80 equivalent piping feet) from the farthest cooling module (CM).

Room preparation

The design of the data center should have considered ease of entry for the equipment, floor loading factors, and accessibility to piping and wiring.

The room should be sealed with a vapor barrier to minimize moisture infiltration. (Polyethylene film is recommended for ceiling and wall applications.) Rubber- or plastic-based paints should have been applied to concrete walls and floors.

Ensure the room is insulated to minimize the influence of exterior heat loads. The minimum required amount of fresh air should be used 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 operating costs.

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 ft^3 in accordance with ASHRAE Standard 15-2001).

Layout and piping considerations

Top piping. Top piping may be used depending upon the configuration of the site and type of the cooling module (CM).

Bottom piping. A computer room with a raised floor plenum for air distribution can be used for below-floor pipe routing. Check that floor supports do not interfere with piping.

Note: Bottom refrigerant piping is not recommended with InRow OA units.

Use vibration isolation for all refrigerant piping.

Installation access

The RDU is designed to be a stand-alone unit. It can be placed against a wall inside or outside the data center, at the end of a row of racks, or any open area that is suitable for use.

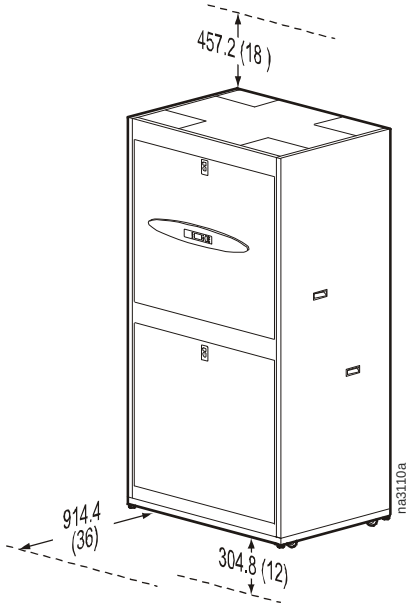
The front panel must be removed during the installation process. An area of 914 mm (36 in) is required for installation.

Clearance for service access

Note: The minimum clearance for top piping installations is 457.2 mm (18 in).
The minimum raised floor clearance for bottom piping installations is 304.8 mm (12 in).

Service access dimensions

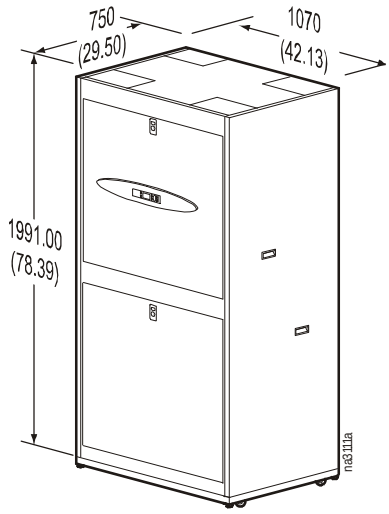
For service, an area of clear space around the RDU is required as shown.



Note: Bottom clearance is optional for top piping; top clearance is optional for bottom piping.

Dimensions are shown in mm (in).

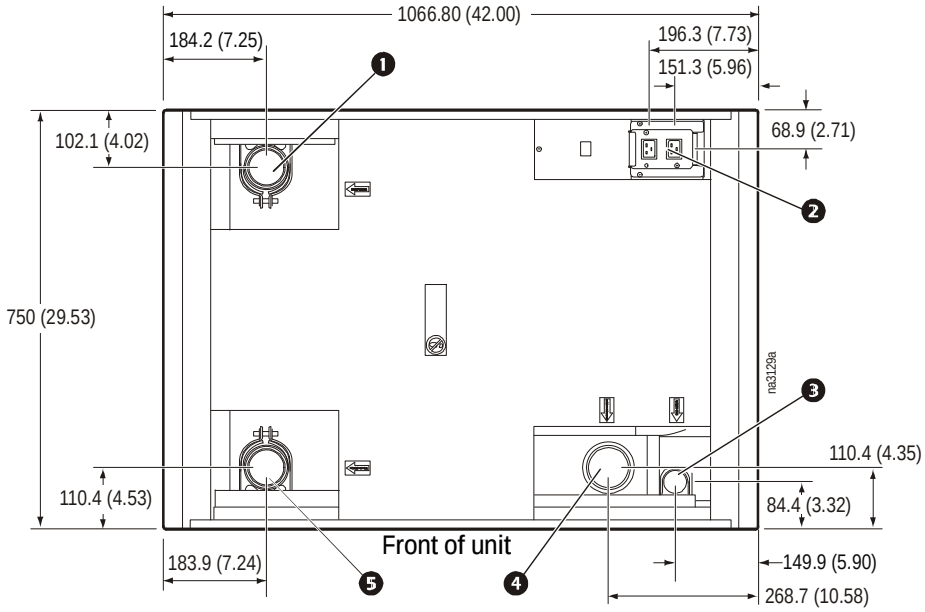
Equipment dimensions



Net weight: 544 kg (1200 lb)
Dimensions are shown in mm (in).

Piping and Power Access Locations

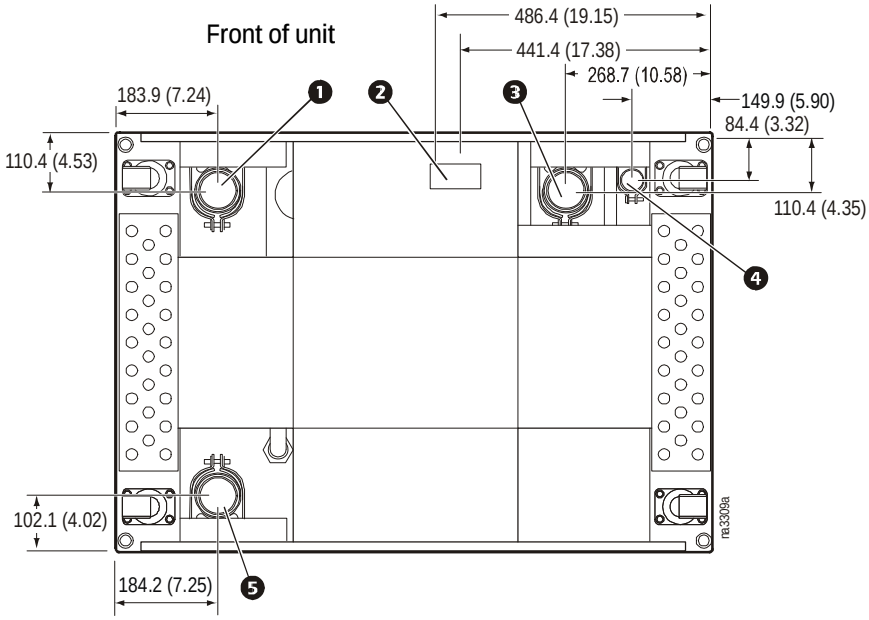
Top view



Dimensions are shown in mm (in).

Item	Description	Item	Description
❶	Chilled water inlet	❹	Refrigerant return line
❷	Top electrical power connections (as shipped)	❺	Chilled water outlet
❸	Refrigerant supply line		

Bottom view (looking up)



Dimensions are shown in mm (in).

Item	Description	Item	Description
❶	Chilled water outlet	❹	Refrigerant supply line
❷	Bottom electrical power connections (optional)	❺	Chilled water inlet
❸	Refrigerant return line		

Installation

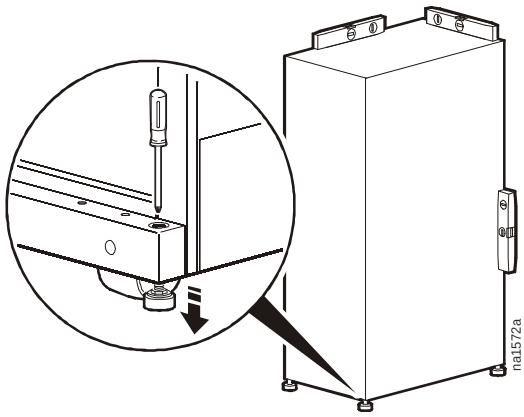
Securing the Unit

Leveling

The leveling feet provide a stable base if the floor is uneven, but cannot compensate for a badly sloped surface.

Once the equipment is in its intended location, use a Torx® T30 screwdriver to turn each leveling foot until it makes contact with the floor. Adjust each foot until the equipment is level and plumb.

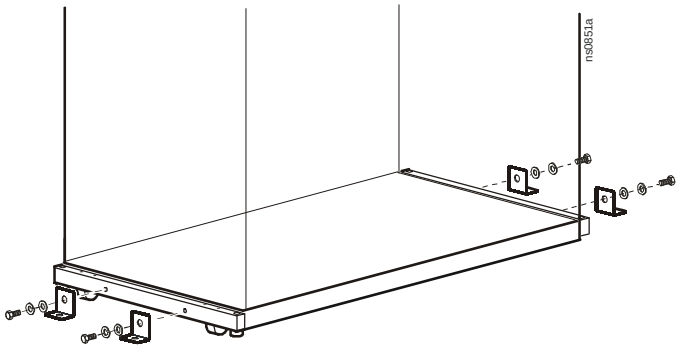
You can remove the casters and leveling feet to allow the equipment to rest directly on the floor.



Stabilizing

Hardware to secure the RDU to the floor at its final location is provided in the ship-loose kit.

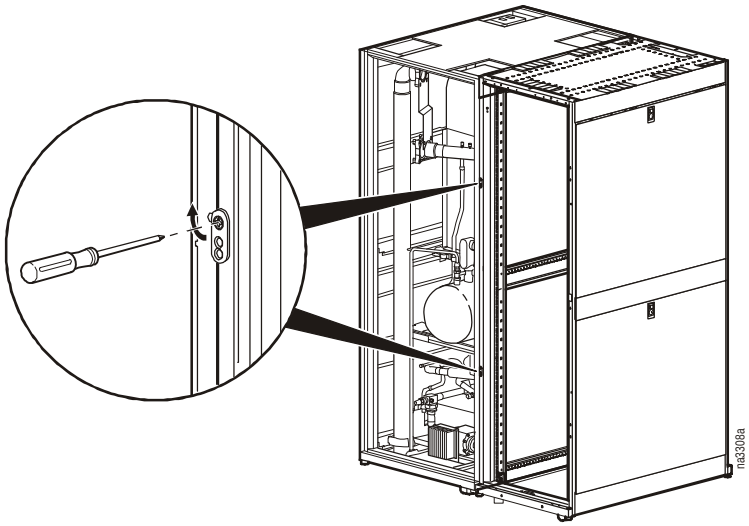
1. Attach the mounting brackets to the RDU using the four fasteners.
2. Secure the brackets to the floor using fasteners appropriate for the floor material.



Note: Use code-compliant fasteners to secure the unit to the floor.

Joining to enclosures

1. Remove the front doors from the enclosure if necessary. See “Removing the Panels” on page 4.
2. Locate the two joining brackets on the enclosure.
3. Rotate each bracket ninety degrees toward the RDU, so that the brackets are parallel to the floor.
4. Align the enclosure and the RDU to use the appropriate holes on the front and rear of both units for the spacing you need.



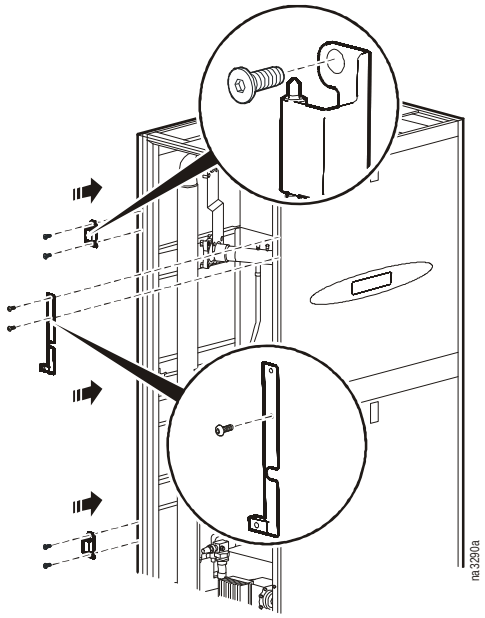
5. Secure the enclosure to the RDU using one M5 × 12 flat-head screw per bracket.

Install the Rack Door Kit

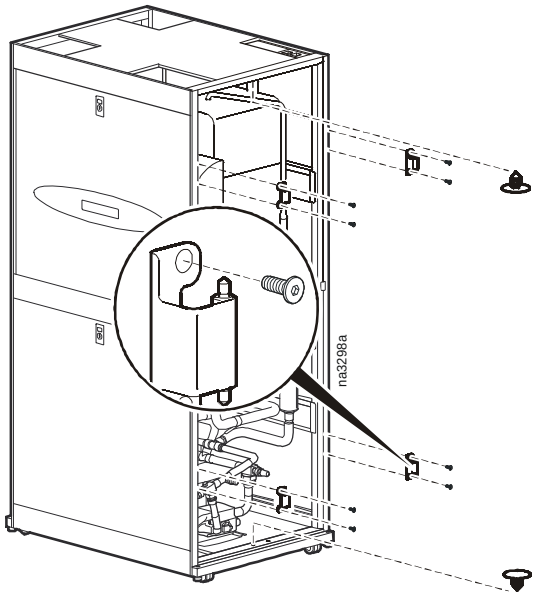
1. Remove both side panels from the RDU. See “Removing the Panels” on page 4.

Note: The single door and double doors can be installed on either side of the RDU unit.

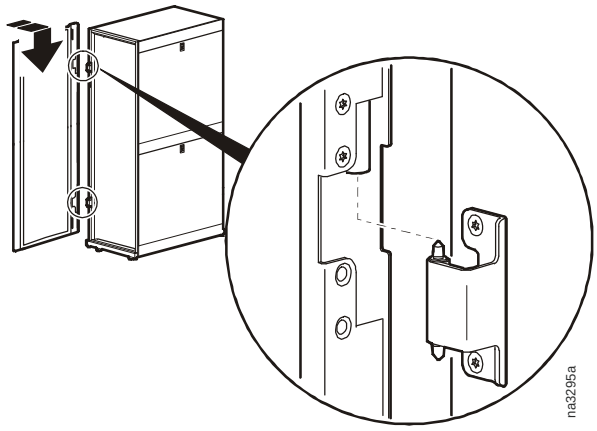
2. Install two hinges for the single door using two T30 M6 × 12 flat head Torx screws on each hinge as shown.
3. Install the closure bracket using two T30 M6 × 12 pan head Torx screws as shown.



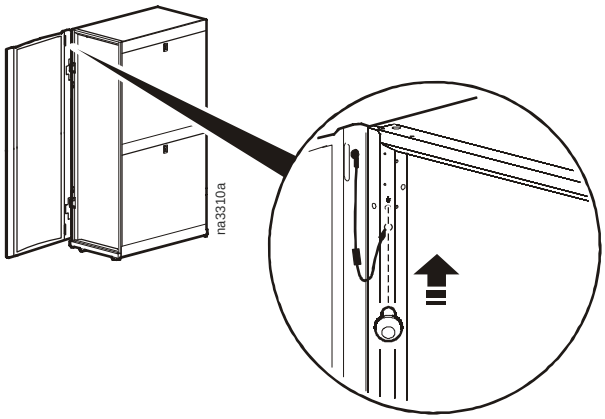
4. Install four hinges for the double doors using two T30 M6 × 12 flat head Torx screws on each hinge as shown.
5. Remove four plastic plugs covering the door closure holes from top and bottom of the frame.



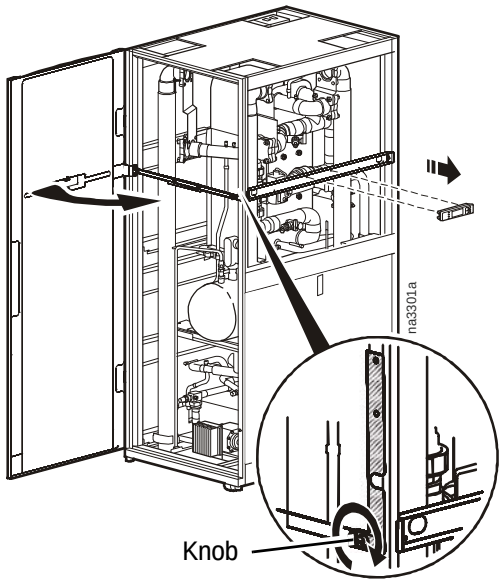
6. Install a single door by holding it approximately 90° to the frame of the RDU.
7. Align the door hinges with the hinge pins on the frame.
8. Lower the door onto the hinge pins, making sure the pins engage with the hinge barrels on the door.
9. Connect the grounding wire.
10. Make sure that the door opens and closes properly.



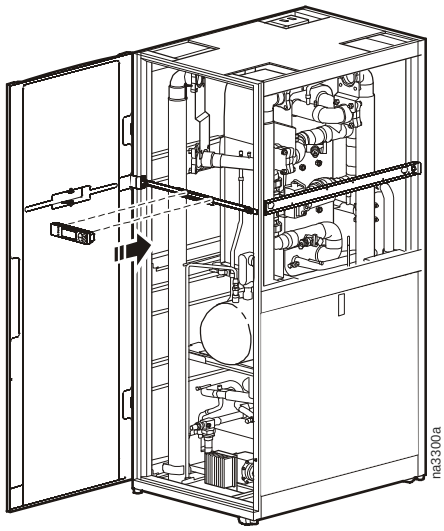
11. Locate the ground symbol on the RDU frame and connect the ground wire from the door to the RDU frame with one M6 × 12 pan head screw and star washer.
12. Remove the front panel containing the display interface. See “Removing the Panels” on page 4.



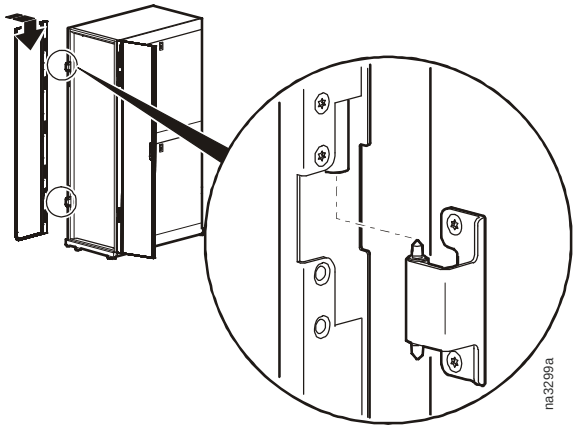
13. Swing the display interface mounting bracket away from the door. Secure it to the closure bracket mounted to the RDU frame with the knurled knob.
14. Disconnect the wiring from the display interface and remove it from the front mounting bracket.



15. Attach the display interface to the side mounting bracket and secure it with the screws removed earlier.
16. Connect wiring to the display interface.
17. Move the panel where the display interface was previously mounted to the opposite side of the RDU.



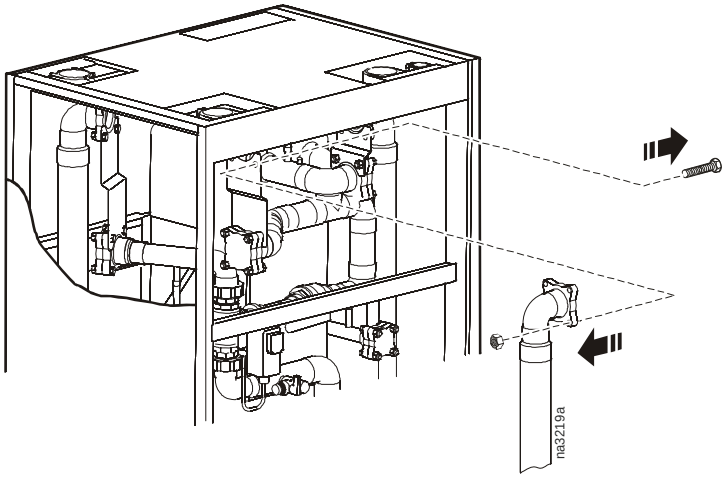
18. Install the double doors by holding them approximately 90° to the frame of the RDU.
19. Align the door hinges with the hinge pins on the frame.
20. Lower the doors onto the hinge pins, making sure the pins engage with the hinge barrels on the door.
21. Locate the ground symbol on the RDU frame and connect the ground wire from each door to the RDU frame with one M6 × 12 pan head screw and one star washer.
22. Make sure that the doors open and close properly.



Fluid Connections

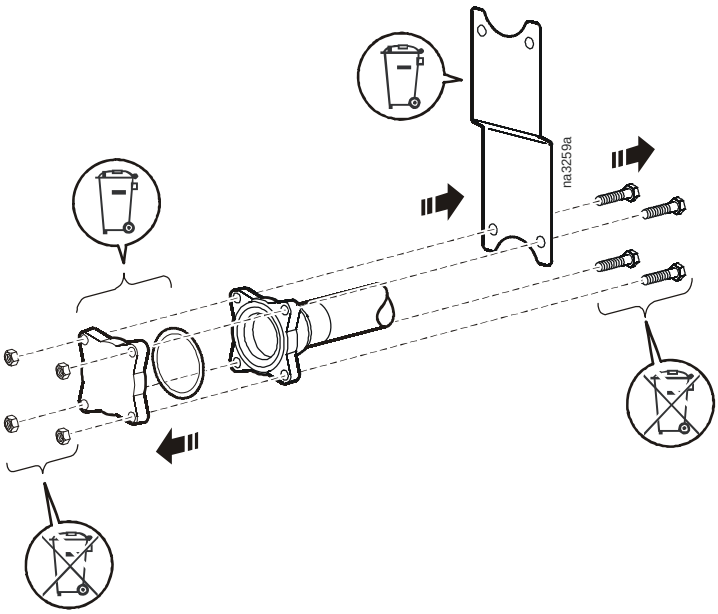
Prepare to install piping

1. Chilled water and refrigerant piping is secured inside the unit during shipping using clamps (not shown) and shipping brackets. Remove all pipes and set them aside as shown (chilled water outlet pipe removal shown).



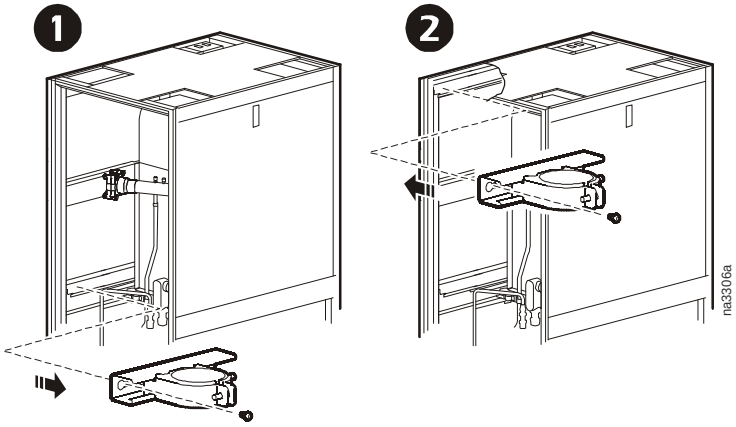
Warning: The RDU is shipped from the factory with a holding charge of nitrogen. Wear eye protection and be careful when opening the system.

2. Remove all shipping brackets, flange plates, and O-rings as shown.



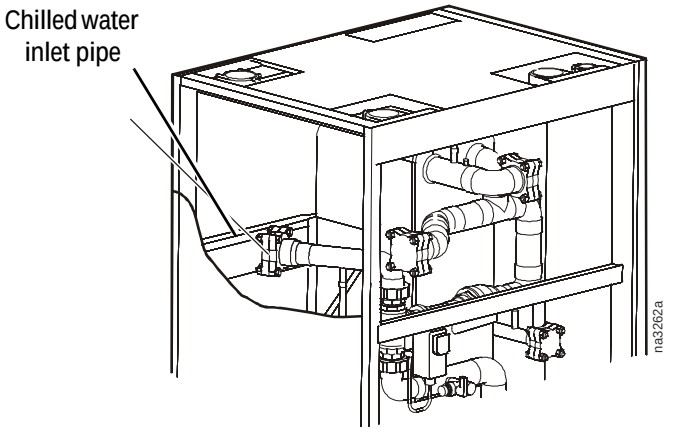
Install top and bottom piping

1. For top piping only, move the clamp and clamp mounting bracket from their original location in the center of the unit to the top of the unit.



Note: Brackets are shown being removed from the side, but may also be removed from the front.

2. Beginning with the chilled water inlet pipe, measure and cut each pipe as required to connect it to the facility piping.

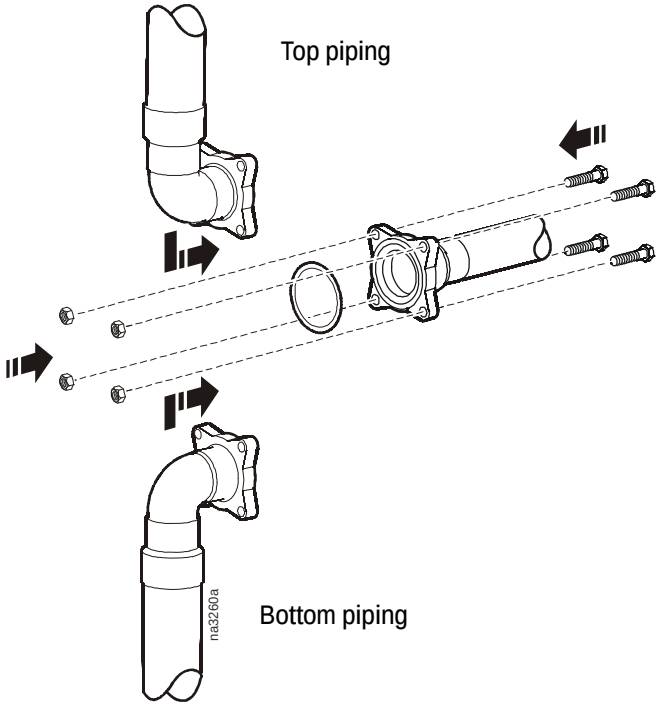


3. Route each pipe through its corresponding clamp at the top or bottom of the unit.
4. Assemble each pipe to the internal fitting as shown, using the bolts removed earlier.

Caution: Use new o-rings (supplied). Do not reuse the o-rings installed at the factory.

5. Secure each pipe with the four nuts removed earlier.
6. Torque the nuts to 45 N-m (33 lb-ft).

Caution: Tighten the nuts in a cross pattern to avoid warping the flange.



Chilled water piping to the RDU

Comply with all local and national codes with respect to the type of piping and the method of connecting piping to the unit. Top or bottom piping may be used, depending on the configuration of the site.

Note: When brazing field-installed copper refrigeration lines, use a nitrogen purge to minimize contamination of the refrigeration system during the brazing process.

See “Internal Piping Diagram” on page 14.

Note: To minimize obstructions, install particulate strainers and filters on the supply line coming into the RDU. Locate strainers between the RDU and any other devices on the chilled water supply line. Damage due to improper filtration will not be covered under warranty.

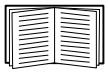
Pipe size. The chilled water inlet and outlet connections on the RDU are 3-inch copper. The supply and return connections may be directly brazed to external piping, or flanges may be brazed to them (recommended).

Note: Use a redundant (customer-supplied) 20-mesh strainer in the bypass line in systems with possible debris or heavy particulates.

Refrigerant distribution piping

Refrigerant lines in the RDU have been dehydrated at the factory and are shipped with a holding charge of nitrogen. Test all refrigerant lines for leaks before adding another holding charge.

Flexible stainless steel piping or one, two, and three port piping manifold kits are used to connect the RDU to the CM.



See the appropriate CM installation manual for piping and header information.

Brazing recommendations. Be sure to use only clean, refrigerant-grade (ACR type "L") hard copper pipe. High-temperature braze all joints; do not use soft solder. Top or bottom piping may be used, depending on the configuration of the site.

Caution: Ensure all pipes are level and that no traps exist in the system.

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

Pipe size. The distribution line size for the refrigerant supply is 1-1/2 in nominal pipe size (1-5/8 in ACR tubing size). The refrigerant return line size is nominally 3 in (3-1/8 in ACR tubing size). Use of other piping sizes is not recommended.

The maximum equivalent length for refrigerant piping between the RDU and the most distant CM is 24.4 m (80 ft). Use the table below to calculate the equivalent length of fittings to ensure that maximum equivalent length is not exceeded.

Connection lines between the RDU and CM are 3/4 in nominal (7/8 in ACR tubing size) for the refrigerant supply and 1-1/4 in nominal (1-3/8 in ACR tubing size) for the refrigerant return. Field-fabricated connections between the CM and distribution piping may be a maximum of 3.05 m (10 ft) equivalent length. This equivalent length must be included in total equivalent length between the CM and RDU.

Note: If flex hoses are used, the total equivalent length is reduced to 19.8 m (65 ft), NOT including the flex hose lengths.

ASHRAE standards for equivalent piping length

Nominal pipe size	ACR tubing size	Type of fitting - equivalent length of pipe in m (ft)						Usage
		90° STD	90° long radius	90° street	45° STD	45°street	180° STD	
3/4 in	7/8 in	0.6 (2)	0.5 (1.4)	1.0 (3.2)	0.3 (0.9)	0.5 (1.6)	1.0 (3.2)	CM supply
1-1/4 in	1-3/8 in	1.0 (3.2)	0.7 (2.3)	1.7 (5.6)	0.5 (1.7)	0.9 (3)	1.7 (5.6)	CM return
1-1/2 in	1-5/8 in	1.4 (4.0)	(0.8) 2.6	1.9 (6.3)	0.6 (2.1)	1.0 (3.4)	1.9 (6.3)	Header supply
3 in	3-1/8 in	2.3 (7.5)	1.5 (5.0)	3.7 (12.0)	1.2 (4.0)	2.0 (6.4)	3.7 (12.0)	Header return

R/D is approximately equal to 1 except for 90° long radius which is approximately equal to 1.5.
Source: 2006 ASHRAE Handbook-Refrigeration, 2.16 Table 16

Gross leak check

Warning: Do not exceed 1379 kPa (200 psig) while checking the refrigerant lines, or damage to the refrigerant pumps will occur.

When all pipe runs are completed, and before installing insulation, perform a gross leak check. Bring pressurized air or nitrogen into the equipment to reach the maximum working pressure of 1034 kPa (150 psig) for the refrigerant piping or 2068 kPa (300 psig) for the water piping.

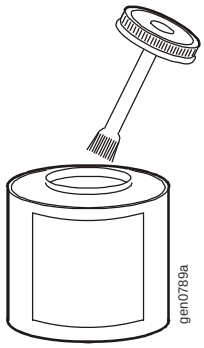
The system should hold pressure for 24 hours (recommended). After that time, check the gauges for a drop in pressure.

Caution: Introduction of refrigerant or other liquids to the system without prior testing for leaks could result in damage to other equipment in the vicinity.

Piping insulation

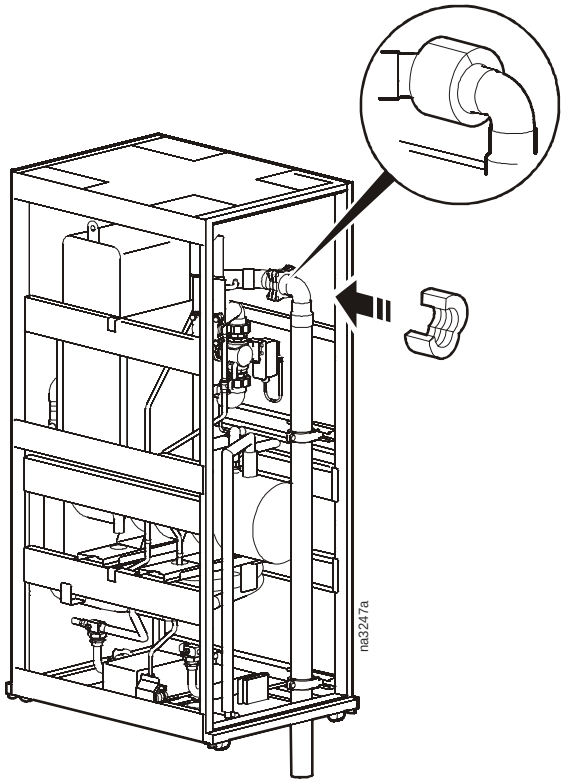
Use only approved insulation (closed cell elastomeric insulation with sealing seams). Insulation should be 12.7 mm (1/2 in) thick. All horizontal insulation sections must be installed with seams facing up. Each section of insulation must be glued to the adjacent section. Any insulation sections that must be fitted around piping support clamps (other than supplied clamps) must be glued together to prevent condensation.

Insulation adhesive. Use a low-VOC (Volitile Organic Compounds), black contact adhesive specifically designed for joining seams in pipe insulation. Use a black colored adhesive to achieve a neater finished insulation. Apply a thin coat of adhesive to both surfaces. Allow the adhesive to dry but still be tacky to the touch. Position the pieces accurately when contact is made. Apply moderate pressure over the entire area to ensure the seam is sealed.



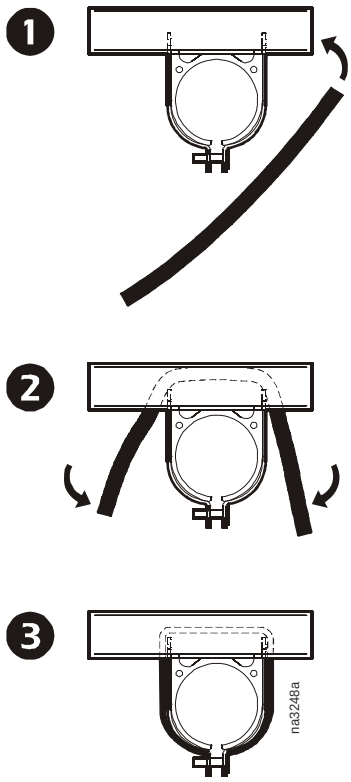
Insulate flanges

1. Install provided insulation to all pipe flanges as shown.
    a. Apply adhesive to surfaces in accordance with manufacturer instructions. Allow the adhesive to dry but still be tacky to the touch.
    b. Position the pieces accurately when contact is made. Apply moderate pressure over the entire area to ensure the seam is sealed.
    c. Repeat for all remaining flanges in the unit.

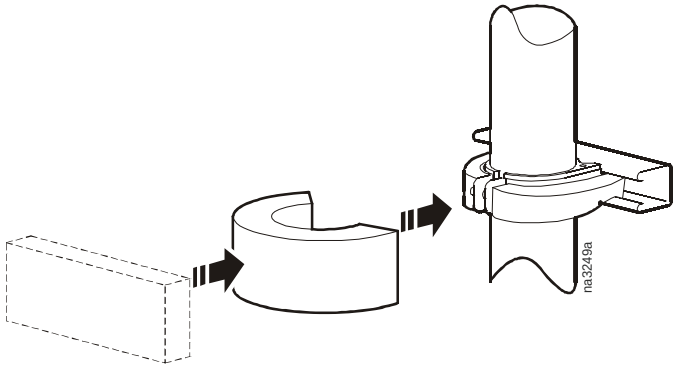


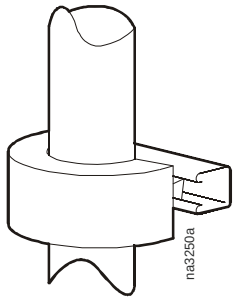
Insulate clamps

1. Insert an insulation strip behind each pipe clamp.
2. Pull the insulation strip through until it is even on both sides of the clamp.
3. Secure the insulation strip with adhesive.



4. Apply adhesive and form the clamp cover insulation pieces to fit over the insulation strips installed previously.





Water filling procedure

For top piped systems, it is recommended that service valves be added to the field installed piping at the highest points in the system. To fill the RDU with water, open the subcooler supply ball valve and manually set the electronically driven valves to 100% open. With the chilled water return valve closed, open the supply valve slowly while depressing the service valve core at the highest point in the field installed piping until water begins slowly flowing from the vent. For bottom piped systems, follow the same procedure as top piped systems but instead use the chilled water outlet service port to purge air from the system. This service port is located just upstream of the chilled water outlet connection flange inside the unit.

Evacuate the refrigeration system

Ensure all isolation valves to the CMs are open. Use a deep vacuum pump and pull the first vacuum down to 750 microns. Due to the large system volume, it may take several hours to evacuate the system. Use large displacement vacuum pumps for this process. Wait for one hour (vacuum should not rise above 1500 microns) and then break the vacuum with nitrogen. Pull a final vacuum down to 500 microns for a minimum of two hours.

Note: Use only R-134a refrigerant to charge the system.

The installing contractor is responsible for providing sufficient refrigerant to complete the system charge during start-up. The required charge is 18.2 kg (40 lbs) R-134a refrigerant, plus 2.3 kg (5 lbs) for every cooling module and 1.5 kg/m (1 lbs/ft) of refrigerant supply piping.

For example, a system with five cooling modules and 15.25 meters (50 feet) of refrigerant supply piping would require the following amount of refrigerant:

IP (in-lb) units: 40 lbs + 5 lbs X 5 + (1 lb-ft X 50) = 115 lbs total required charge

SI (metric) units: 18.2 kg + 2.3 kg X 5 + (1.5 kg/m X 15.25 m) = 52.6 kg total required charge

Apply a refrigerant vapor holding charge if the unit will not be commissioned within 24 hours of the evacuation procedure.

Apply the R-134a vapor holding charge into the service port located on the receiver vent line just above the main control board until the system pressure equalizes with the refrigerant canister. Chilled water service is not necessary to apply a holding charge.

Caution: The RDU must be supplied with chilled water at a maximum temperature of 11º C (52 ºF) in order to fully charge the system. DO NOT run the refrigerant pumps to charge the system as this may cause damage to the pumps that will not be covered under warranty.

For more information about charging the system, see the *Pumped Refrigerant System O&M manual.*

Power Connections

Power cords method

As delivered, power receptacles are located at the top of the unit. The standard electrical connection for the RDU is with the included power cords. Insert the cords into the receptacle in the top of the RDU, then connect them to a suitable power source.

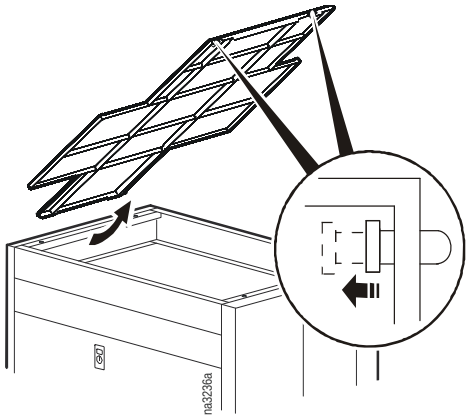
Note: If the supply cord is damaged, it must be replaced by a special cord or assembly available from the manufacturer or its service agent.

Direct connection method

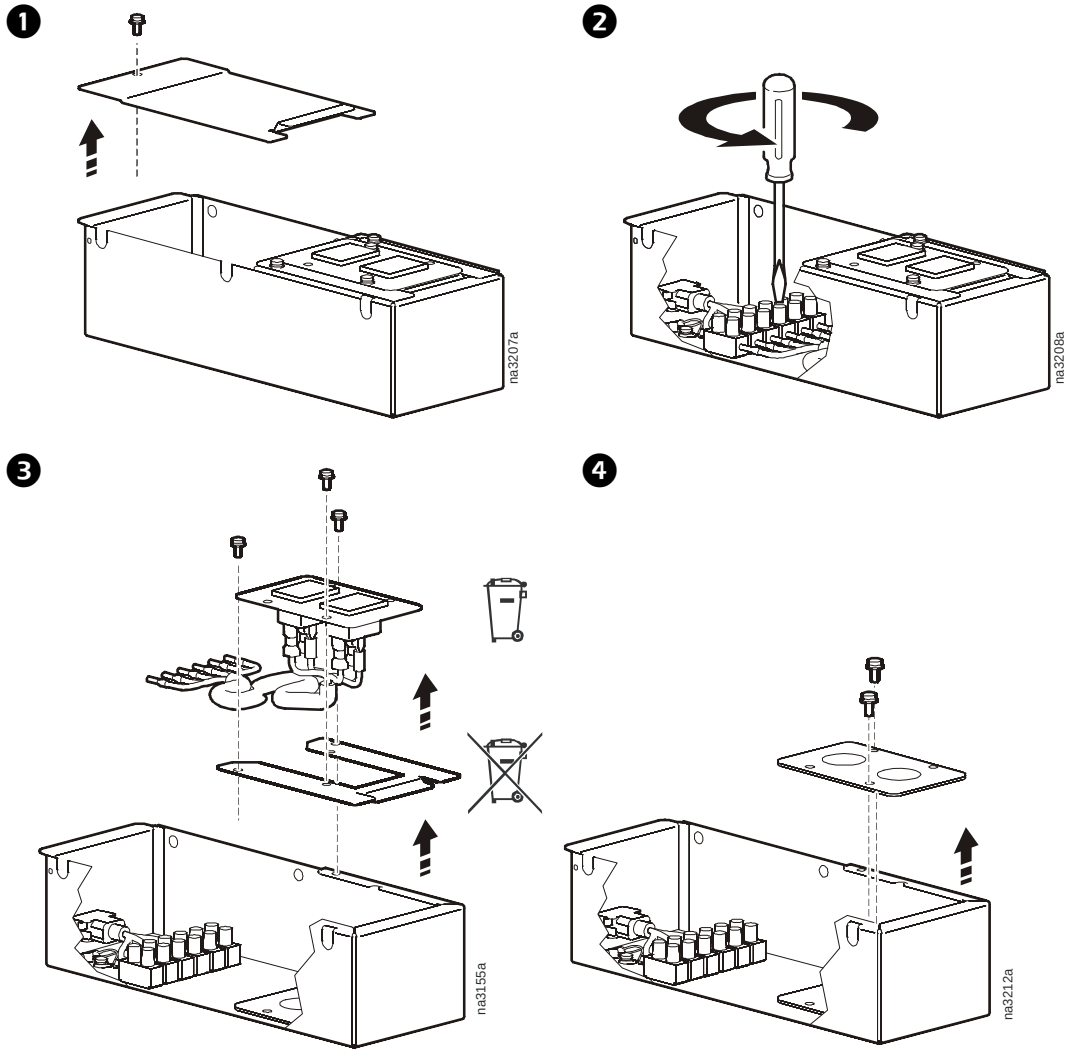
1. You may need to remove the roof for easier access.

Note: All conduit and wiring is field-supplied.

Note: The junction box does not have to be removed from the RDU to perform the top wiring modification. For clarity, the RDU is not shown.



2. Disassemble the junction box by removing parts as shown:



3. Assemble components as shown.

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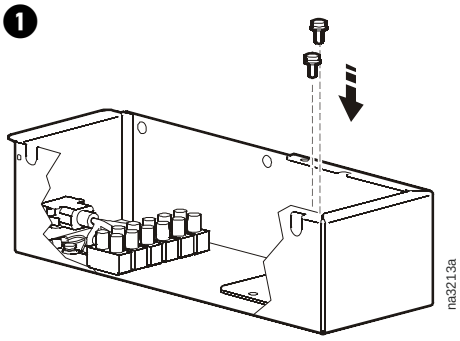

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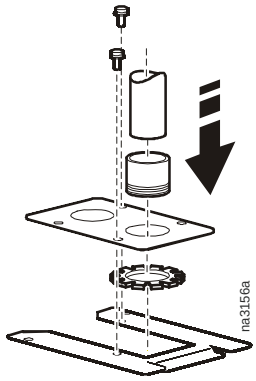

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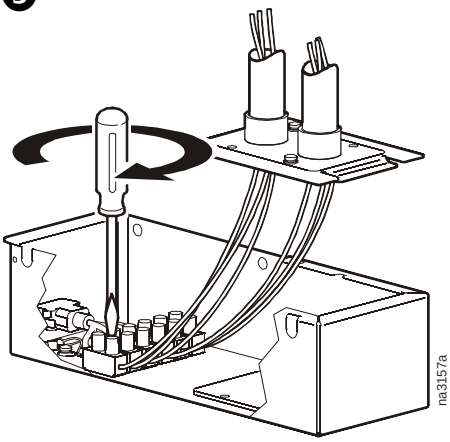
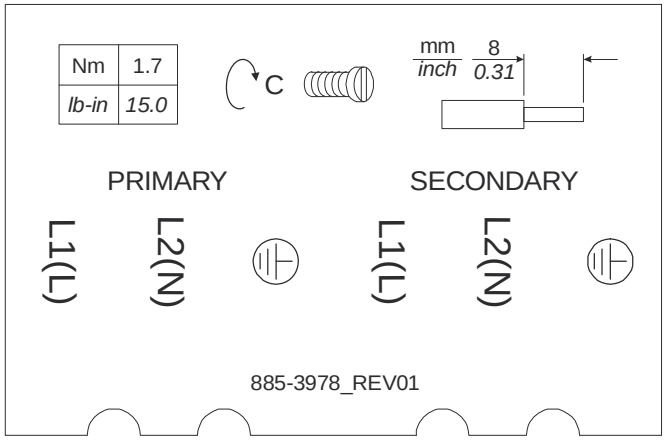


Connect wiring and torque terminal screws per the label, as shown



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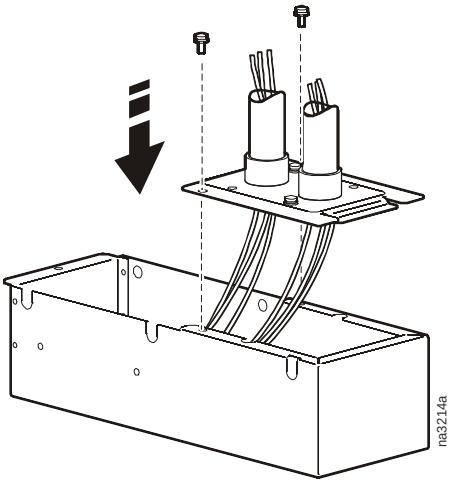

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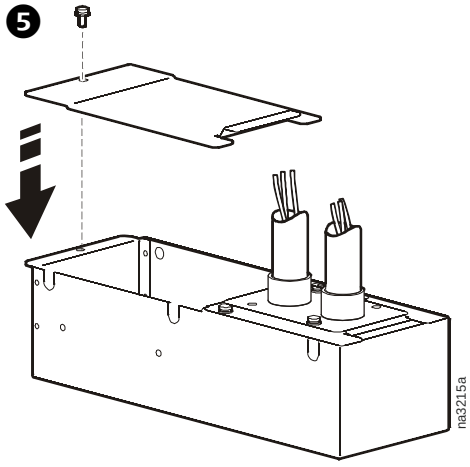
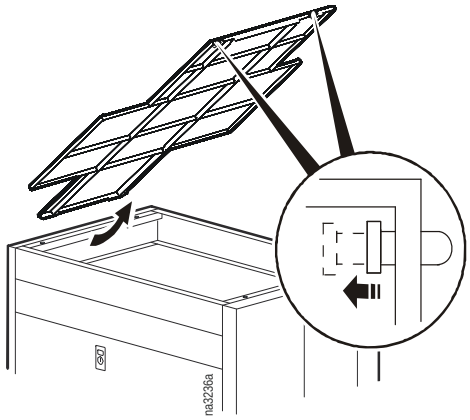


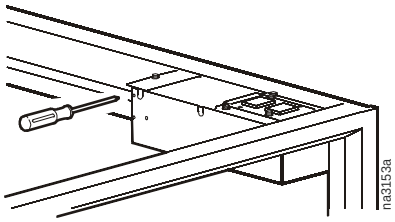
Bottom wiring

Remove the junction box from the top of the unit:

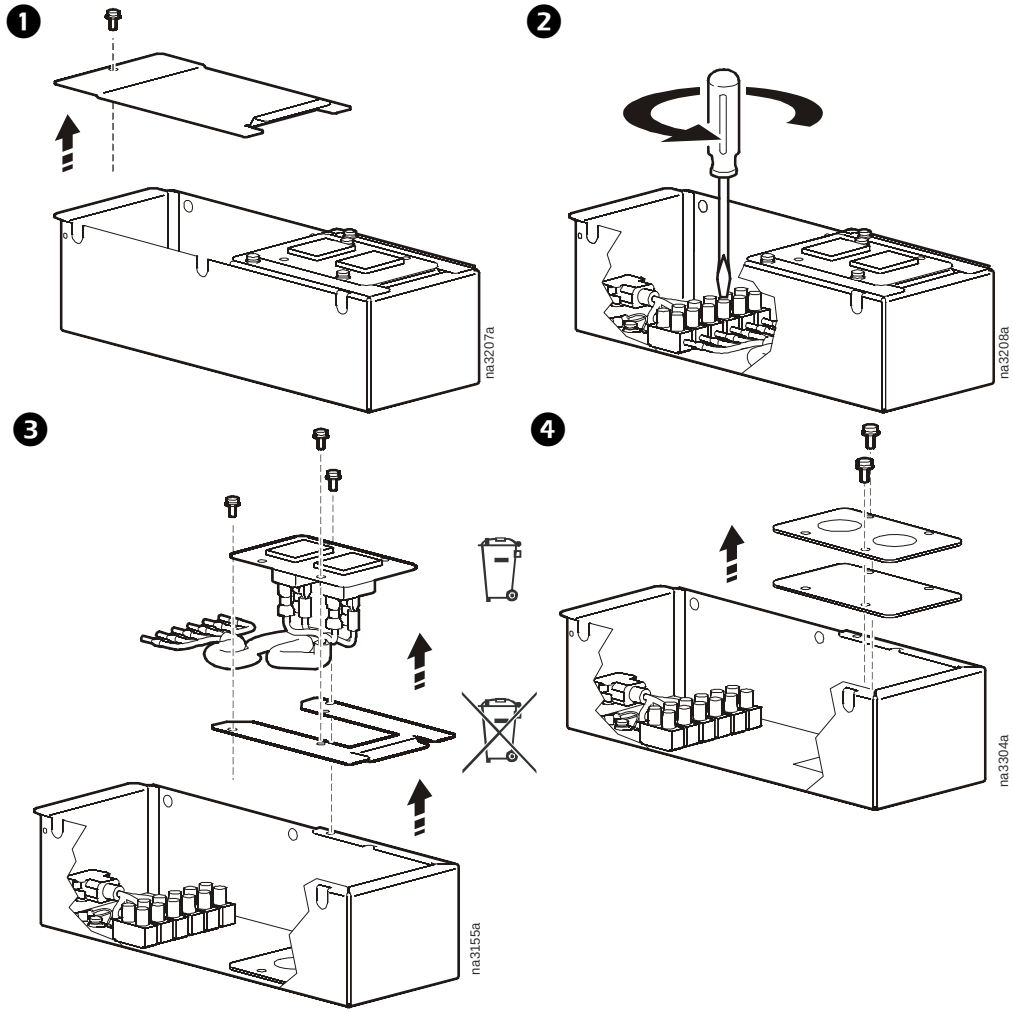
1. Remove the roof.
2. Remove the internal electrical connection from the junction box.



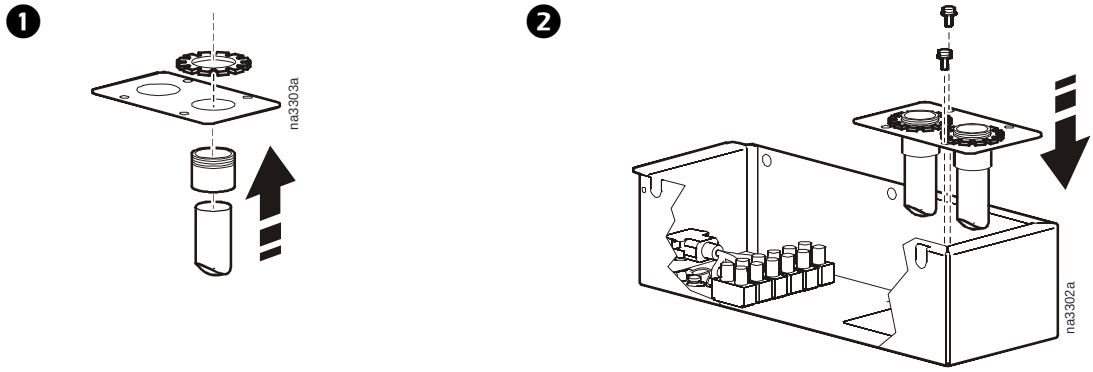
3. Remove three Torx screws securing the junction box to the unit frame as shown. Save the screws for later use.
4. Remove the junction box.



5. Disassemble the junction box by removing parts as shown.

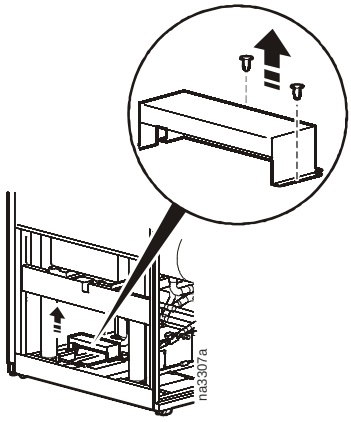


6. Assemble components as shown.

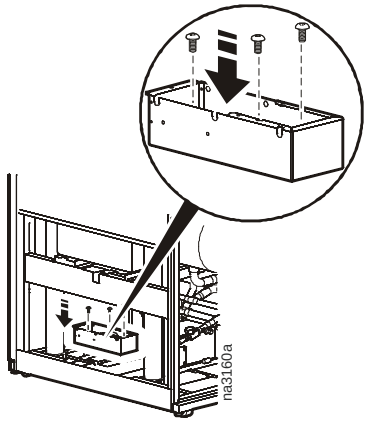


Install the junction box

1. Remove the drip shield by prying up two plastic clips.
2. Set the drip shield and plastic clips aside for later use.

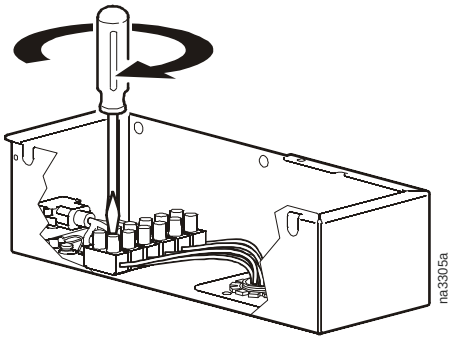


3. Install the junction box in the RDU as shown.
4. Secure the junction box with the three screws that held it in place at the top of the RDU.

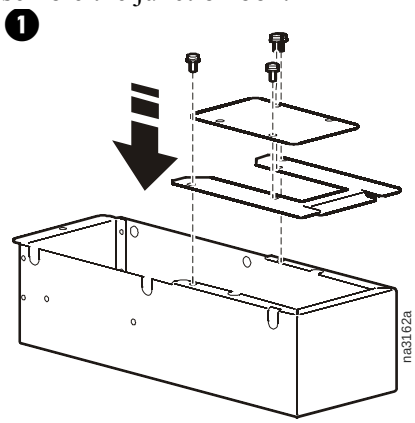


5. Route wiring into the junction box, connect to the terminal strip, and torque the screws as shown on the label.

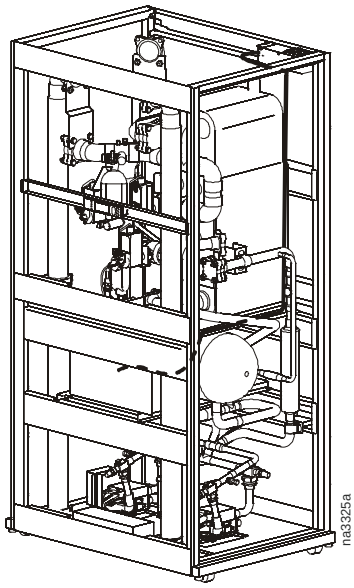
Note: For clarity, the RDU is not shown.



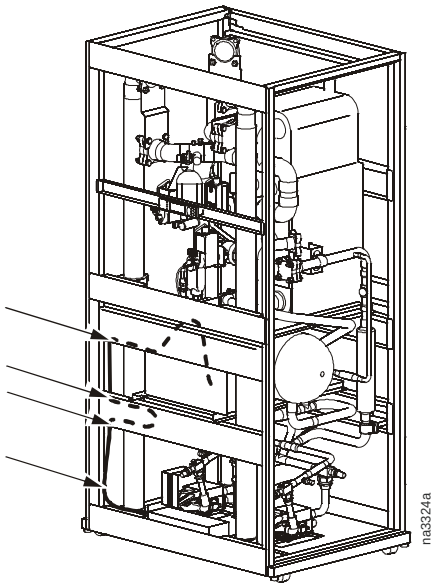
6. Assemble the junction box.



7. The internal power cable is routed as shown. Cut all the tie wraps that secure the internal power cable.

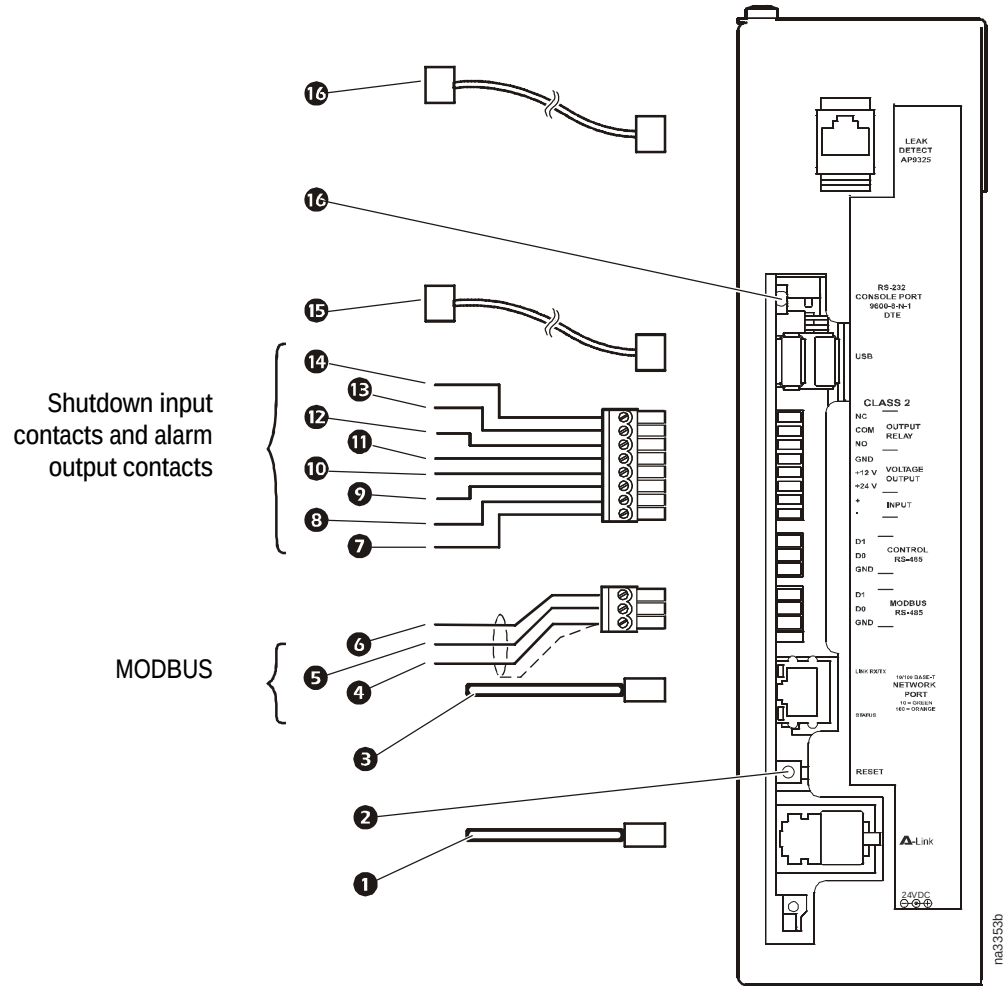


8. Route the internal electrical connection cable to the junction box as shown. Connect the cable to the junction box.
9. Using tie wraps, secure the cable at the locations shown with arrows.
10. Reinstall the drip shield.



Communications Connections

User interface connection pinout



❶	A-Link port	❿	+12 Vdc supply (current limit 20 mA)
❷	Reset button	⓫	Supply ground
❸	Network port Pins 1-8 = Standard CAT-5 RJ-45	⓬	Alarm output NC (normally closed contacts)
❹	Modbus ground	⓭	Alarm output COM (common) (30V AC/ DC 2 amp maximum)
❺	D0 -	⓮	Alarm output NO (normally open contacts)
❻	D1 +	⓯	USB ports
❼	Remote shutdown -	⓰	RS232 Console port
❽	Remote shutdown + (12-30 Vac/Vdc, 24 Vdc @ 11 mA)	⓱	Leak detector (AP9325)
❾	+24 Vdc supply (current limit 20 mA)		

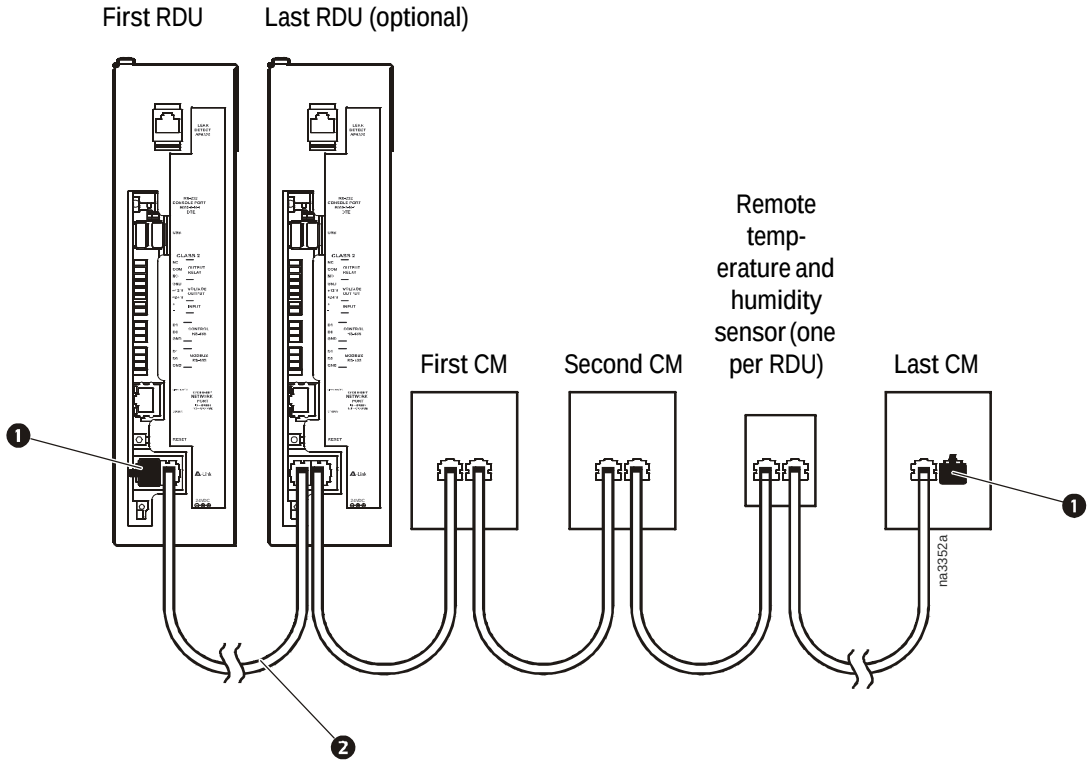
A-Link ports

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

Warning: Devices connected on the A-Link ports are to use a standard pinout (1-1, 2-2, 3-3, 4-4, 5-5, 6-6, 7-7, 8-8) cat5 cable only, otherwise damage to electronics will occur.

Note: A maximum of 30 units (RDUs and overhead units) can be connected using the A-Link ports. The maximum wire length for the entire group may not exceed 305 m (1,000 ft).

A special RJ-45 terminator is factory-installed in one of the A-Link ports. A second terminator must be installed in the last empty port in the system, as shown.

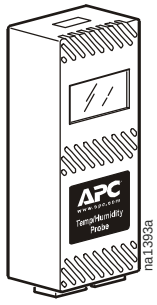


❶ RJ-45 terminator (provided)

❷ A-Link cable

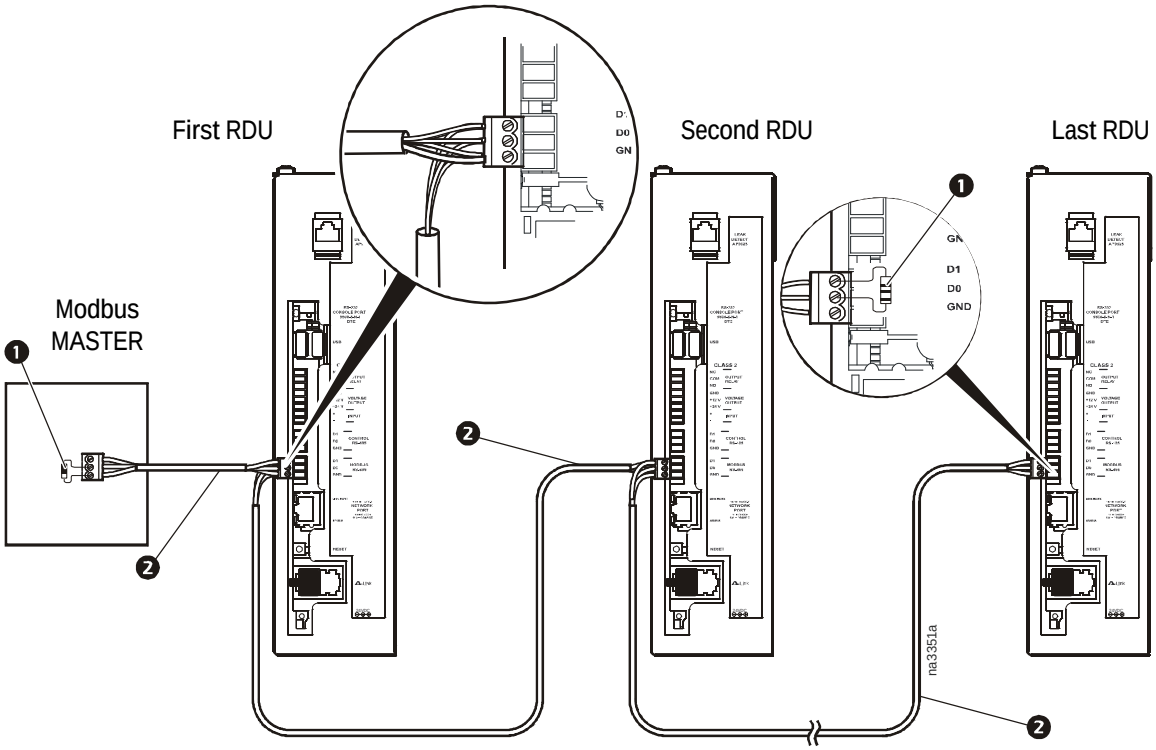
Remote temperature and humidity sensor

See the instructions supplied with the sensor for installation information.



Install the remote temperature and humidity sensor outside the hot aisle as close as possible to a CM. One possible mounting location can be on the panel at one end of the aisle. Connect to the A-Link bus as shown.

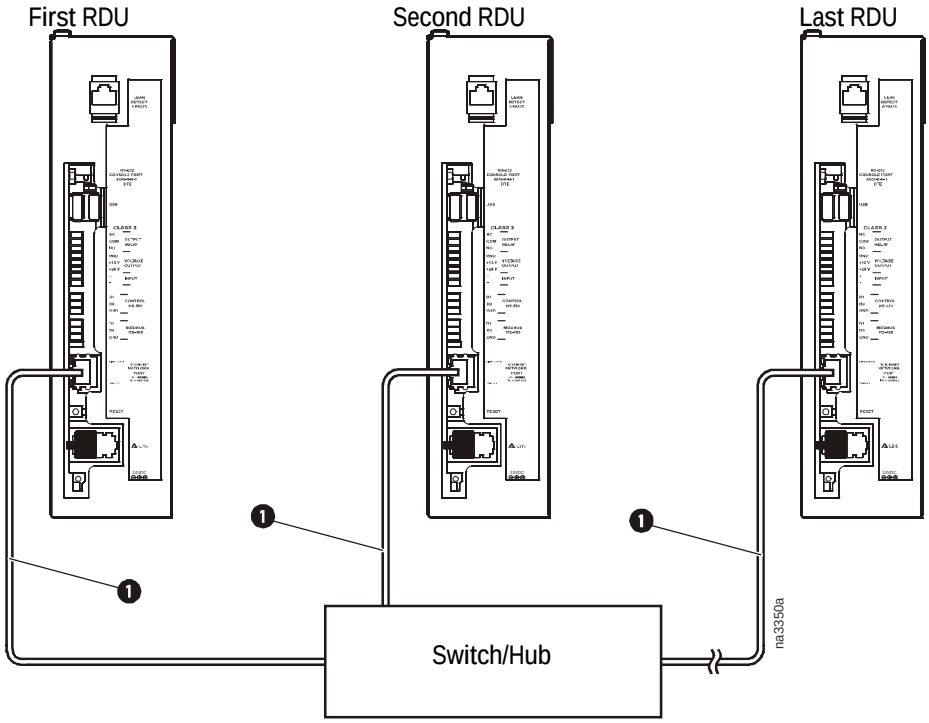
Modbus



❶ 150Ω termination resistor (provided)

❷ Modbus cable (RS-485)

Network port



❶ LAN cable (10/100 Base-T)

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