



HPE Adaptive Rack Cooling System

User Guide

Abstract

This document is for the person who installs racks and rack products. This procedure is performed only by trained personnel. Hewlett Packard Enterprise assumes you are qualified in performing installations and trained in recognizing hazards in rack products.

Notices

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Overview

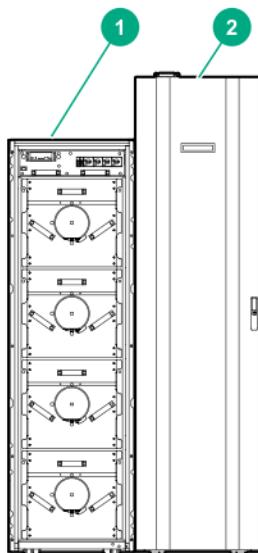
Product overview

The HPE Adaptive Rack Cooling System is a supplemental cooling system for data centers. It is a liquid-to-air heat exchanger and fan system that removes heat generated by rack-installed IT equipment. The HPE Adaptive Rack Cooling System is connected to adjoining racks with baying brackets and front and rear extensions, creating a cold aisle and hot aisle air plenum. Hot air from the IT exhaust is pulled through the HPE Adaptive Rack Cooling System, cooled with the heat exchanger that is connected to facility water, and the cooled air is then returned to the inlet of the servers. The HPE Adaptive Rack Cooling System is offered in four configurations using either HPE ARCS 42U 600x1600mm Racks or HPE ARCS 48U 600x1600mm Racks.

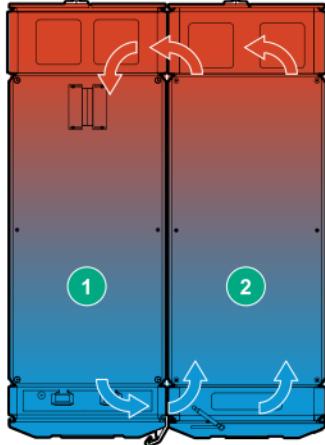
NOTE: The HPE Adaptive Rack Cooling System supports both HPE ARCS 42U and 48U 600x1600mm Racks. For the following front elevation views, the HPE ARCS 48U 600x1600mm Rack is shown. The HPE Adaptive Rack Cooling System is shown without doors for better viewing of components.

The thermal airflow illustrations show a top view of the HPE Adaptive Rack Cooling System and HPE ARCS 42U/48U 600x1600mm Racks.

HPE Adaptive Rack Cooling System + one HPE ARCS 42U/48U 600x1600 Rack

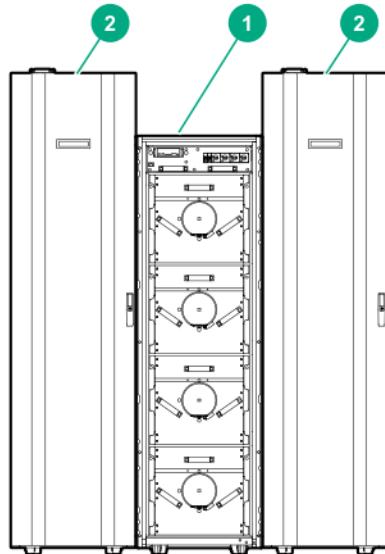


Airflow for HPE Adaptive Rack Cooling System (single-rack configuration)

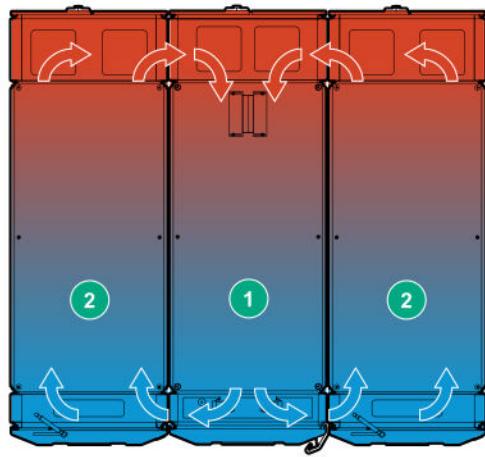


Item	Description
1	HPE Adaptive Rack Cooling System
2	HPE ARCS 48U 600x1600mm Rack

HPE Adaptive Rack Cooling System + two HPE ARCS 42U/48U 600x1600 Racks

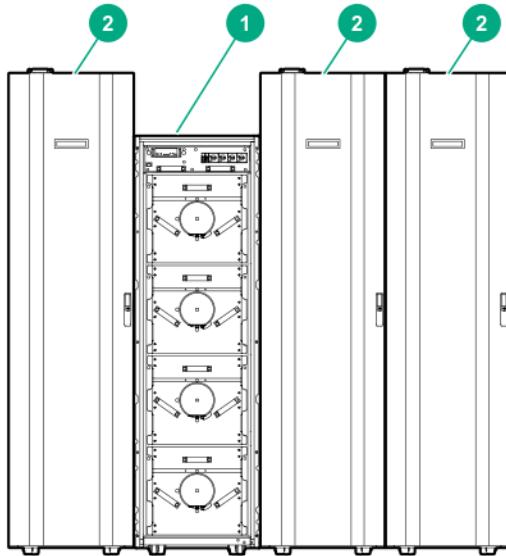


Air flow for HPE Adaptive Rack Cooling System (dual-rack configuration)

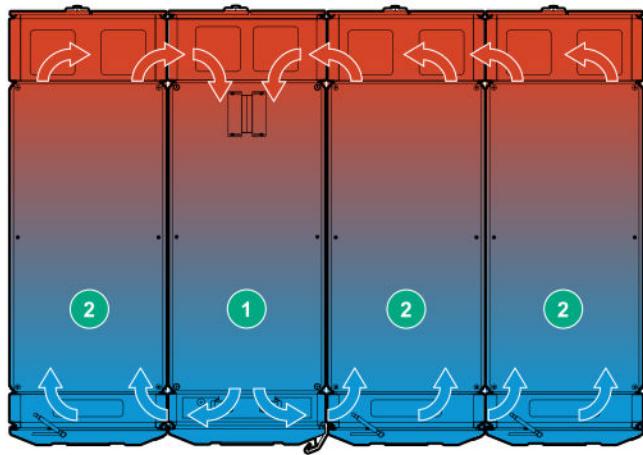


Item	Description
1	HPE Adaptive Rack Cooling System
2	HPE ARCS 48U 600x1600mm Rack

HPE Adaptive Rack Cooling System + three HPE ARCS 42U/48U 600x1600mm Racks

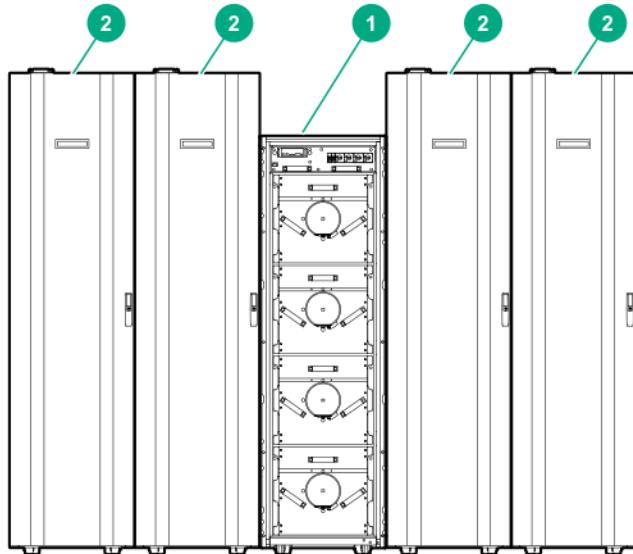


Air flow for HPE Adaptive Rack Cooling System (three-rack configuration)

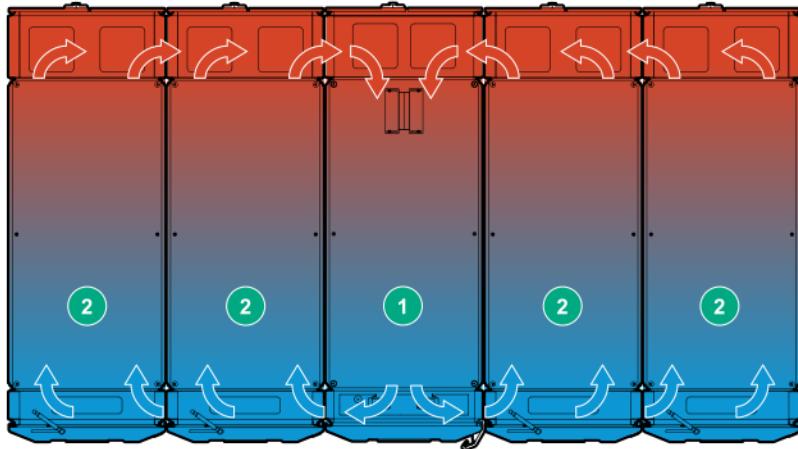


Item	Description
1	HPE Adaptive Rack Cooling System
2	HPE ARCS 48U 600x1600mm Rack

HPE Adaptive Rack Cooling System + four HPE ARCS 42U/48U 600x1600mm Racks



Air flow for HPE Adaptive Rack Cooling System (four-rack configuration)



Item	Description
1	HPE Adaptive Rack Cooling System
2	HPE ARCS 48U 600x1600mm Rack

The airflow of the HPE Adaptive Rack Cooling System fully supports the industry standard front-to-back cooling—cold air pulled into the front of the server and warm air expelled out the rear of the unit. All devices receive adequate and evenly distributed cool air regardless of the mounting position within the rack. The HPE Adaptive Rack Cooling System distributes precisely cooled and targeted air flow evenly across the front of the IT equipment. The HPE Adaptive Rack Cooling System and rack extensions channel warmed air from the rear of the IT equipment into the side-mounted or center-mounted HPE Adaptive Rack Cooling System cooling unit. From there, it is cooled and recirculated to the front of the equipment stack.

A 6U facade comes in the HPE ARCS 48U Air Rack Installation Kit, and you can place it on top of the HPE Adaptive Rack Cooling System to make the HPE Adaptive Rack Cooling System the same height as the HPE ARCS 48U 600x1600mm Racks. The following illustration shows a single-unit configuration with the 6U facade in place on the HPE Adaptive Rack Cooling System and the HPE Adaptive Rack Cooling System doors in place.



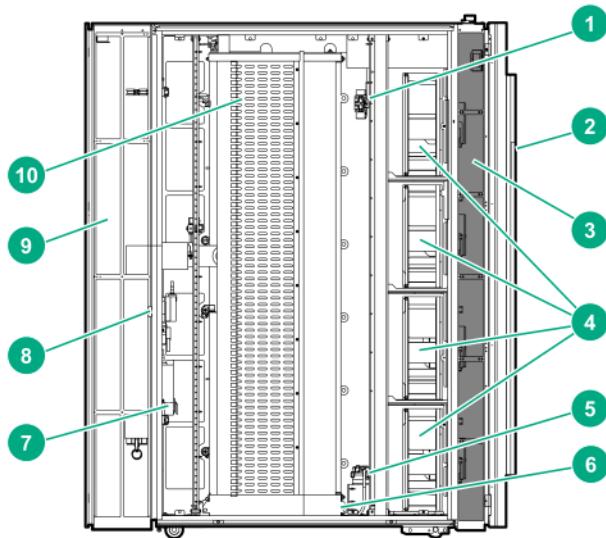
Item	Description
1	HPE Adaptive Rack Cooling System with 6U facade
2	HPE ARCS 48U 600x1600mm Rack

HPE Adaptive Rack Cooling System introduction

Introduction to the HPE Adaptive Rack Cooling System

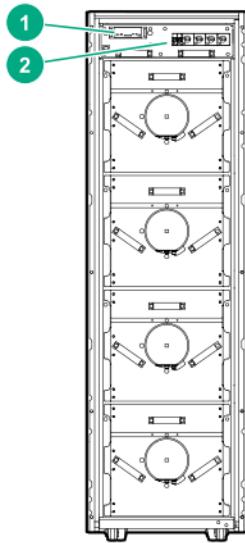
The HPE Adaptive Rack Cooling System is a liquid-to-air heat exchanger and fan system that removes heat generated by rack-installed IT equipment. It is connected to adjoining racks by means of a cold aisle and hot aisle air plenum. Hot air from the IT exhaust is pulled through the HPE Adaptive Rack Cooling System, cooled with the heat exchanger connected to facility water, and the cooled air is then returned to the inlet of the servers.

Unit Side View



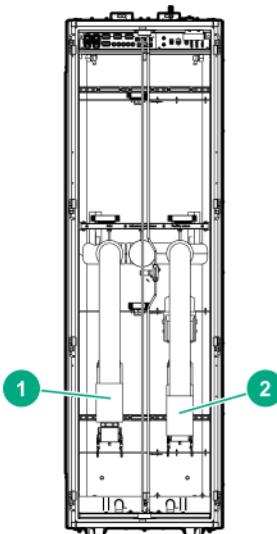
Item	Reference
1	Humidity sensor
2	Touchscreen display
3	Front air plenum
4	Fan units (4)
5	Condensation pump
6	Leak sensors
7	Isolation valves
8	Control valve
9	Rear air plenum
10	Heat exchanger unit

Unit Front View



Item	Description
1	CMC (management module)
2	Transfer switch

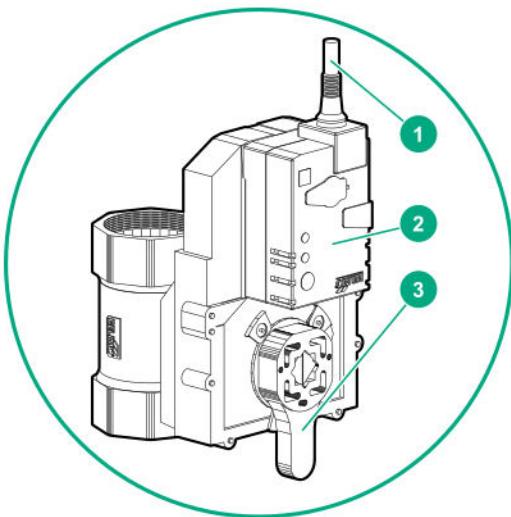
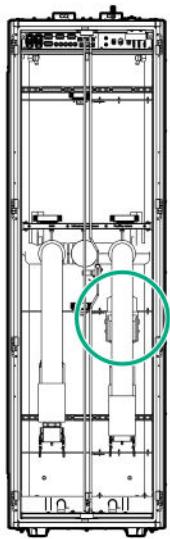
Unit Rear View



Item	Description
1	Water supply
2	Water return

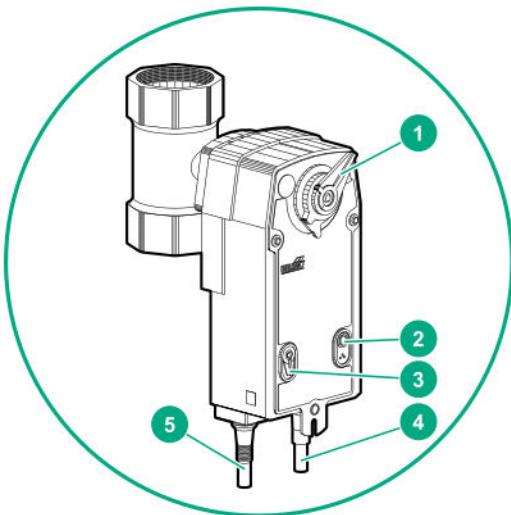
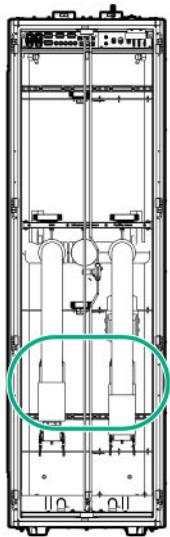
HPE Adaptive Rack Cooling System component identification

Control Valve



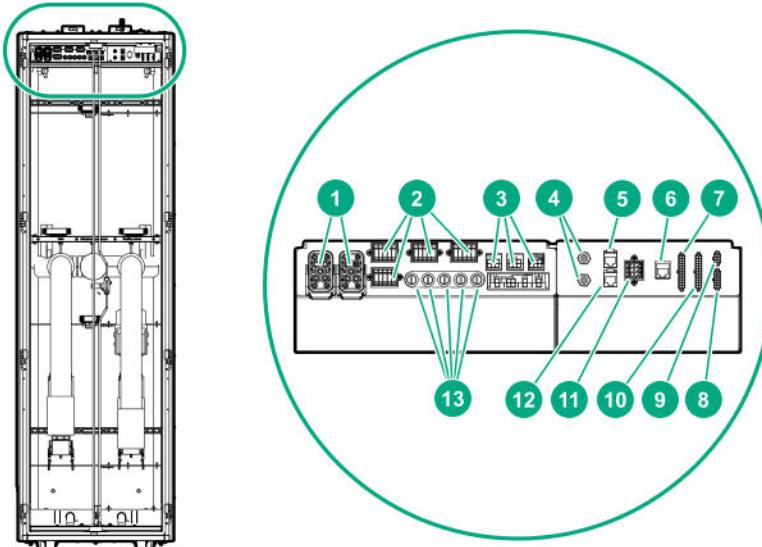
Item	Reference
1	Electrical connector
2	Actuator assembly
3	Valve position indicator

Isolation Valves



Item	Reference
1	Valve position indicator
2	Logic switch
3	Valve lock
4	Valve power connector
5	Valve status connector

Connectors



Item	Reference
1	AC power in
2	Fan power connectors
3	Valve connectors
4	Rear air pressure connectors
5	CAN bus connection
6	Ethernet connection
7 -10	Sensors
11	ARPO (alarm) relay output
12	Door opening
13	Fuses

Configuration factors

Optimum environment and site preparation

 **CAUTION:** Water quality that is out of spec may cause decreased cooling capacity or disruption in service. The facility water supplied to the HPE Adaptive Rack Cooling System must meet the guidelines stated in this manual. The HPE Adaptive Rack Cooling System warranty does not cover damage caused by facility water that does not meet specifications.

To provide optimum performance with minimum maintenance, your site must meet environmental requirements. The HPE Adaptive Rack Cooling System is intended to be installed in an indoor location that is temperature controlled and relatively free of conductive contaminants.

To route water lines to your HPE Adaptive Rack Cooling System, use one of the following methods:

- Through an opening in the raised floor
- Through the top of the HPE Adaptive Rack Cooling System

Safety information

The HPE Adaptive Rack Cooling System is rated at a maximum facility pressure of 8 bar (116 PSI).

If valves are installed on the external pipe work that could potentially trap fluid inside the HPE Adaptive Rack Cooling System, special precautions must be taken. To prevent severe plumbing failure due to extreme pressure, use an expansion tank with a preinstalled safety valve in the plumbing circuit connected to the unit.

 **WARNING:** This equipment must be installed in a restricted access area. The equipment is not to be accessible to persons (including children) with reduced physical, sensory, or mental capabilities, or a lack of experience and knowledge, unless they have been given supervision or instruction. Only authorized technicians trained by Hewlett Packard Enterprise should attempt to repair this equipment. All troubleshooting and repair procedures are detailed to allow only subassembly- or module-level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to modify any printed wiring board. Improper repairs can create a safety hazard.

Installation

HPE Adaptive Rack Cooling System contents

The HPE Adaptive Rack Cooling System contains the following items:

- HPE ARCS Accessory Kit
- Power Cord kit

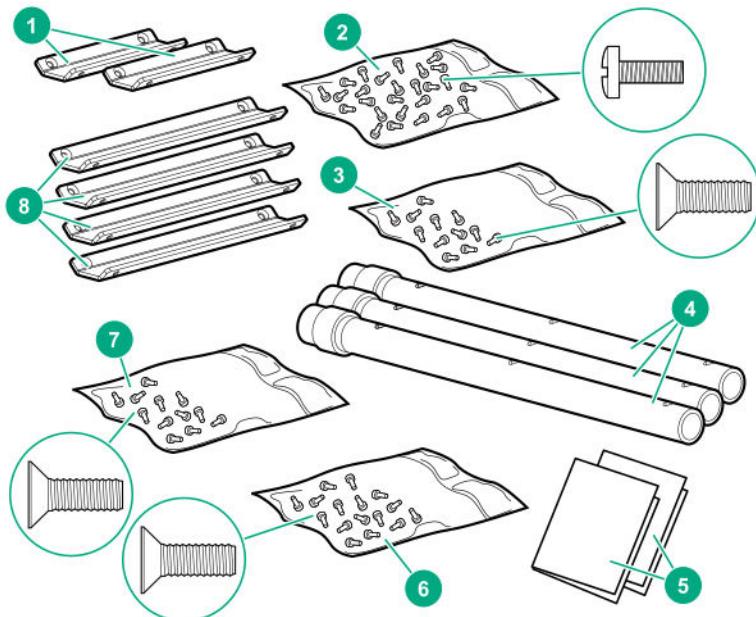
Accessory and option kit contents

If any of the following items are missing or damaged, contact your Hewlett Packard Enterprise authorized reseller. Listed materials are subject to change.

Accessory Kits

HPE ARCS Accessory Kit

The HPE ARCS Accessory Kit comes with the HPE Adaptive Rack Cooling System. Use the parts included in this kit to properly install the HPE Adaptive Rack Cooling System.



Item	Description	Quantity
1	Baying brackets	6 small
2	6-32 x 5/8 Phillips head screws	16
3	M5.5 x 10 Torx screws with serrated head	12

Table Continued

Item	Description	Quantity
4	Air pressure tubing kit with brackets (not shown)*	1
5	Leveling pads	2
6	M6 x 1 x 10 Flathead Torx trilobe screws	16
7	M5.5 x 13 Torx screws	6
8	HPE G2 Rack Baying Kit (Contains brackets and screws used to bay the racks together on either a 600mm or 24-inch pitch.)	2
	Worm drive hose and tube clamps	2
	Panduit boots	2
	Gasket, 15 x 15	1
	Masterkleer PVC clear tubing, 6 ft.	2
	Safety, compliance, & warranty information	1

*The HPE ARCS Air Pressure Tubing Kit contains the following components:

- Aluminum pipe, 1/8" diameter X 18" long, threaded on both ends
- Aluminum end cap, 1/8" diameter
- Barbed, threaded NPTF hose end, 1/8" diameter
- Pipe clamp, galvanized, 3/8"ID X 9/16" long (for HPE Adaptive Rack Cooling System)
- Pipe clamp, galvanized, 3/8"ID X 11/16" long (for HPE ARCS 42U/48U 600x1600mm Racks)
- Screw, 5.5x1.81x10 Pan Torx T25
- Flat washer, M6
- Plastic barbed tube fittings for air & water, 1/8"
- Polyurethane Tubing for Water, 5/32"ID, 1/4" OD

HPE ARCS Power Cord Kit

The HPE ARCS Power Cord Kit contains:

- IEC 60309 32/30A 220/415V 6h/IP44 power cord (Quantity 2)
- NEMA L22-20P 277/480V 4P/5W power cord (Quantity 2)

HPE ARCS Air Rack Accessory Kit

The HPE ARCS Air Rack Accessory Kit comes with the HPE ARCS 42U/48U 600x1600mm Racks. Use the parts included in this kit to properly install the racks.

Item	Description	Quantity
Gasket, 15x15	Foam for sealing the rack	1
HPE G2 Rack Grounding Kit	Cables, screws, and washers used to ground the rack through the rack frame	1
HPE G2 Rack Baying Kit	Brackets and screws used to bay the racks together on either a 600mm or 24-inch pitch	1
Rack Hardware Kit	Screws, cage nuts, and other hardware used to install servers to the EIA rail	1
Cable ties	Used to attach cables to the rack	1
Transportation bracket kit	Install these brackets when rack is fully loaded and will be shipped	1

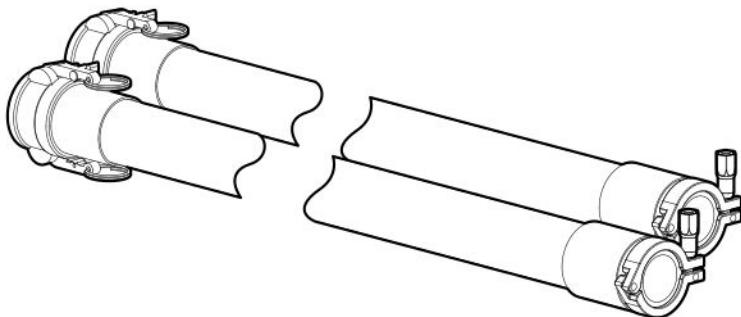
Option Kits

HPE ARCS Water Hook-Up Kit

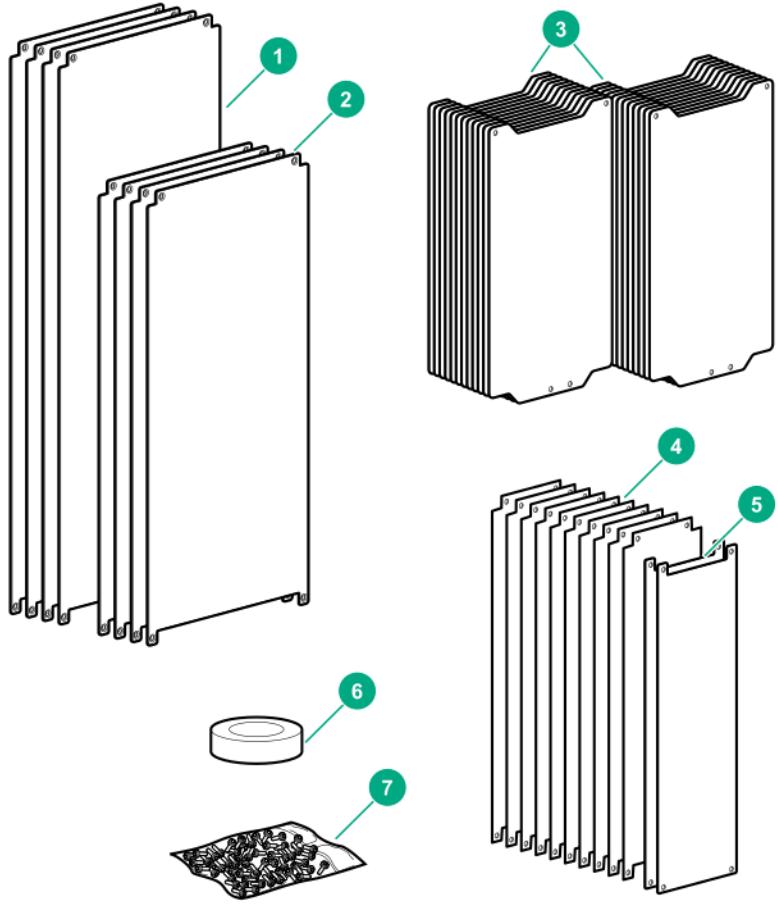
Hewlett Packard Enterprise recommends using the HPE Adaptive Rack Cooling System Water Hook-Up Kit to connect the HPE Adaptive Rack Cooling System to a facility water supply. Each kit includes two hose assemblies with 2-inch sanitary flange connections that are required for connecting the facility supply and return lines to the main inlet and outlet connections of an HPE Adaptive Rack Cooling System. One Water Hook-Up Kit is required for each HPE Adaptive Rack Cooling System.

NOTE: To properly connect the Water Hook-Up Kit, the facility plumbing connection must be a 2-inch flange fitting.

NOTE: The illustration is not drawn to scale. The actual length of the hoses is approximately 1.83 m (6 ft).

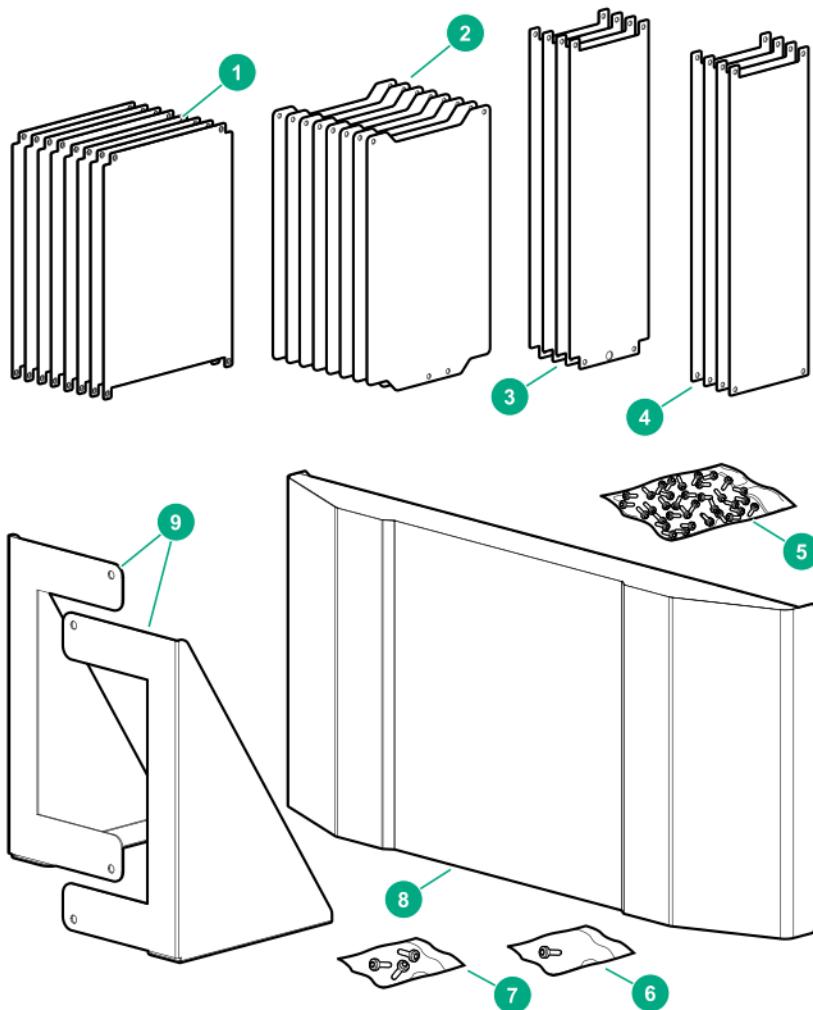


HPE ARCS 42U Air Rack Installation Kit



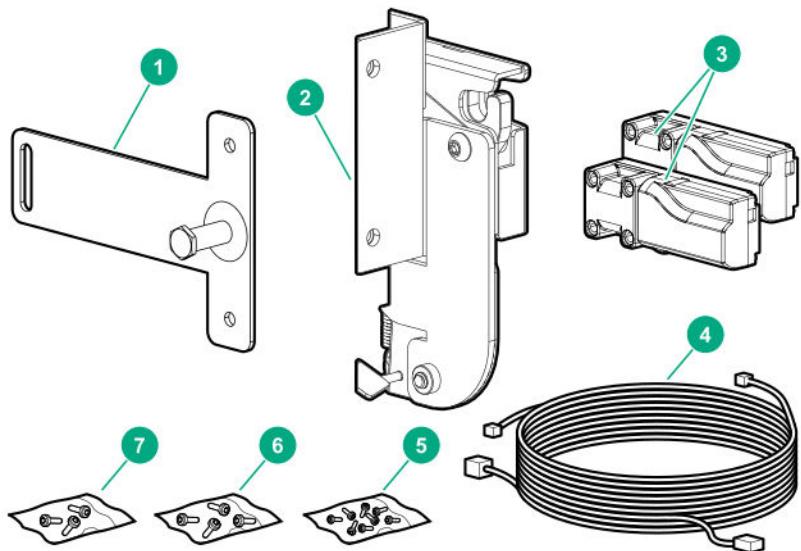
Item	Description
1	Large side panel blank for the rear extension (4)
2	Small side panel blank for the rear extension (4)
3	Rack side panel blank (24)
4	Side panel blank for the front extension, Panel B (10)
5	Side panel blank for the front extension, Panel D (2)
6	Side panel sealing tape
7	Screws, 6-32, 3/8" long (160)

HPE ARCS 48U Air Rack Installation Kit



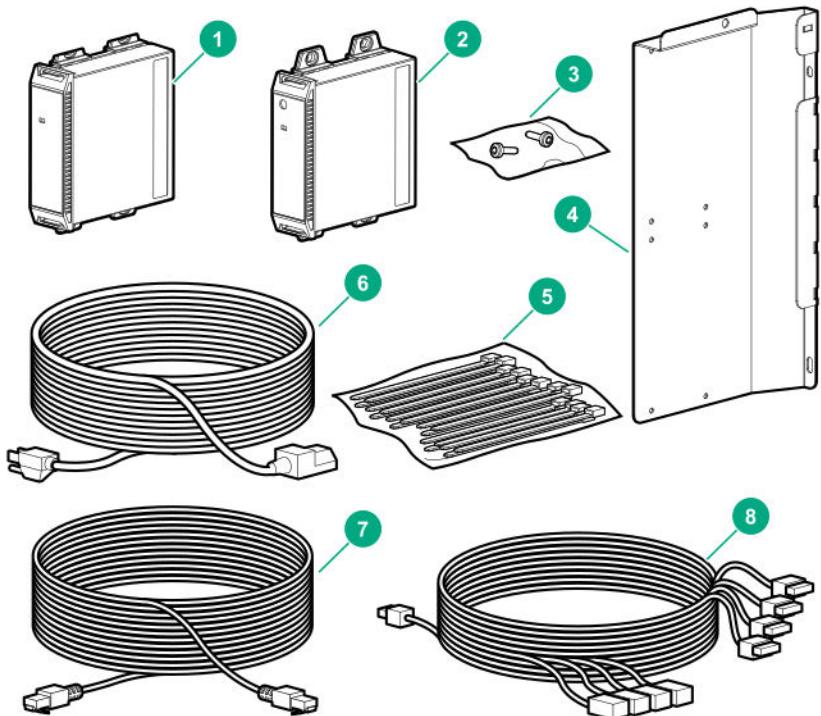
Item	Description
1	Rack side panel blank, 48U (8)
2	Rack side panel blank (8)
3	Side panel blank for the front extension, Panel C (4)
4	Side panel blank for the front extension, Panel A (4)
5	Screw, 6-32, 3/8" long (80)
6	Grounding screw (1)
7	Screw, 5.5 X1.81X10 Pan Torx T25 (3)
8	Facade, 6U (1)
9	Left and right extension brackets

HPE ARCS Auto Door Release Kit



Item	Description
1	Striker assembly with Southco R4-90-121-10 (1)
2	Front door latch assembly with bracket (1)
3	Rear door latch assembly (2)
4	Auto door cable harness assembly (1)
5	Screws, rear lock mount (8)
6	Screws, 1/4-20 button head (2)
7	Screws, M5.5X10 Torx pan head tap (3)

HPE ARCS Auto Controller Kit



Item	Description
1	Power supply, 24 Volt (1) with mounting hardware
2	CMC III I/O ARCS Rack Module (1) with mounting hardware
3	Screws, M5.5X10 Torx pan head tap (2)
4	Custom mounting bracket (1)
5	Zip ties (50)
6	C13/14 power cord, 12 ft (1)
7	CanBus cable, 5 meters (1)
8	HPE Adaptive Rack Cooling System IO Module cable (1)

Required tools

The following tools are required for installation:

- Flat blade screwdriver
- #2 Phillips screwdriver
- Adjustable wrench
- Torx screwdriver set

- Bubble level
- (Optional) 5mm square head key for hex drain

Installing the HPE Adaptive Rack Cooling System

Procedure

1. Read the unpacking instructions on the HPE Adaptive Rack Cooling System packaging material.



WARNING: The HPE Adaptive Rack Cooling System is shipped on a pallet and weighs approximately 645 kg (1,423 lb) by itself or 732 kg (1,614lb) including packaging. Hewlett Packard Enterprise recommends hiring professional movers to move the unit, remove the HPE Adaptive Rack Cooling System from the pallet, and move the HPE Adaptive Rack Cooling System to the final location.

2. Using four or more people and the ramps that came with the HPE ARCS 42U/48U 600x1600mm Rack, remove the HPE Adaptive Rack Cooling System from the pallet.
3. Roll the HPE Adaptive Rack Cooling System to the final location.



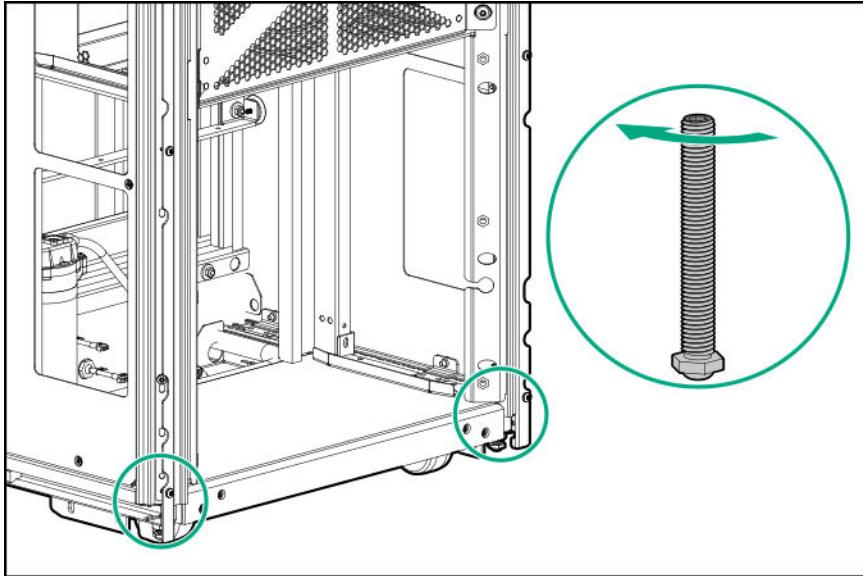
CAUTION: Before attaching the hoses to the HPE Adaptive Rack Cooling System, verify that the water supply and return are closed. Water that leaks into the unit can cause significant damage.

4. Install the hoses, differential pressure tube, and Panduit boots.
5. To level the HPE Adaptive Rack Cooling System:
 - a. Remove the screws from the fan housing.
 - b. Unplug the fan communication and power cables.
 - c. Remove the lower fan from the rack.



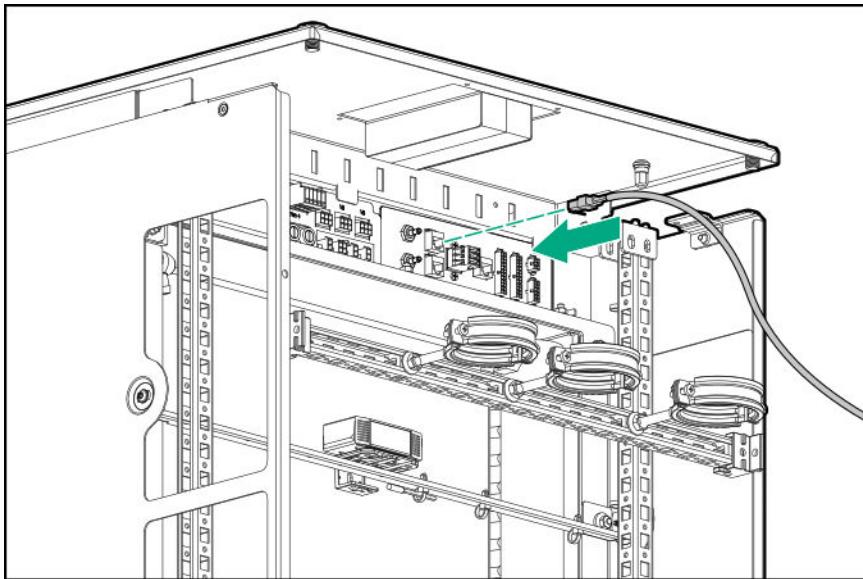
CAUTION: Use a minimum of two people to manually move the fan.

- d. Adjust the leveling feet using a bubble level.



⚠️ WARNING: To avoid tipping the HPE Adaptive Rack Cooling System over, be sure that the leveling feet are lowered when the HPE Adaptive Rack Cooling System is equipped, serviced, and operated.

6. Connect the network cable to the RJ-45 connector (labeled "ETH") on the transfer switch at the top right on the rear of the HPE Adaptive Rack Cooling System.



7. Plug the other end of the network cable into the facility network connection outlet.

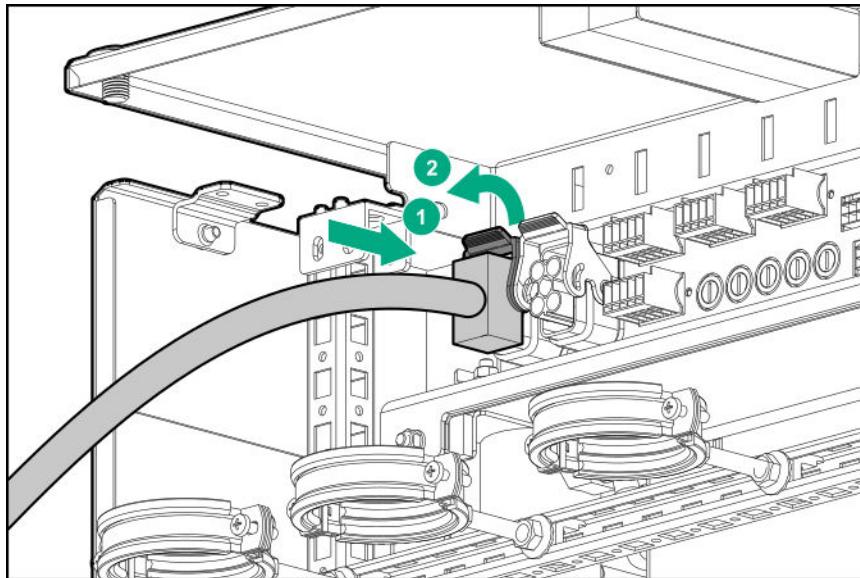
⚠️ WARNING: Before connecting the power cords to a power source, be sure that the unit is properly grounded for potential equalization caused by high leakage current.

❗️ IMPORTANT: Do not connect the power cords into a power source before connecting to the HPE Adaptive Rack Cooling System.

8. Plug the primary power cord into the power connector on the left at the power distribution inside the HPE Adaptive Rack Cooling System.

If you are using a secondary power cord, plug it into the power connector on the right.

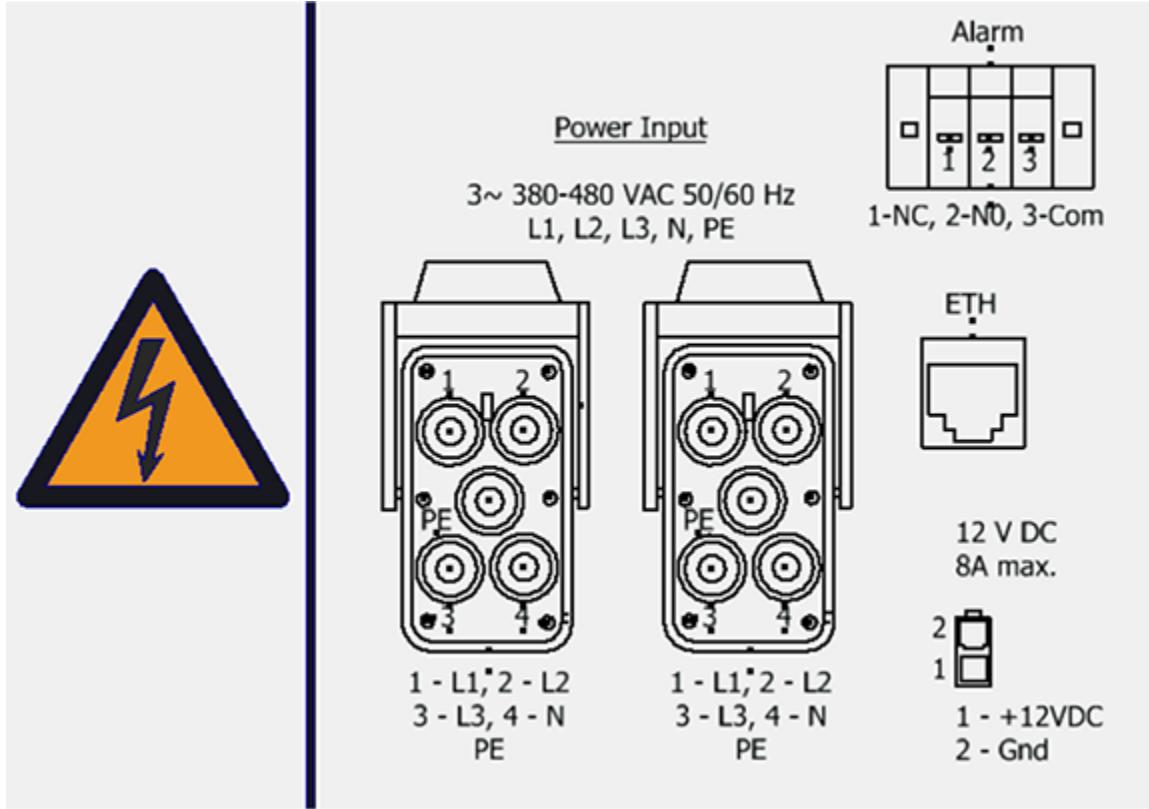
⚠ CAUTION: Do not force installation of power cords. Power cords are keyed and can only be installed in one direction. Forcing cables into plugs can permanently damage the cable or the plug.



⚠ WARNING: To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
- To disconnect power to the equipment, unplug the power cord from the power source.
- Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the rack.

⚠ WARNING: To reduce the risk of fire, connect the power cord to a power outlet with overcurrent protection not exceeding 20A.



⚠ WARNING: To reduce the risk of electric shock, completely remove power before servicing by disconnecting both power cords.

NOTE: If no secondary power is connected, the transfer switch will indicate a fail status for the secondary power supply.

9. Guide the other ends of the power cords through the HPE Adaptive Rack Cooling System, and then plug them into an appropriate power source.
10. Check for any errors on the display screen. If errors are displayed, see [**HPE Adaptive Rack Cooling System troubleshooting**](#).

For information on entering network settings, accessing controls, reviewing the details on the info page, and resetting to factory defaults, see the *HPE Adaptive Rack Cooling System Web Interface Guide*.

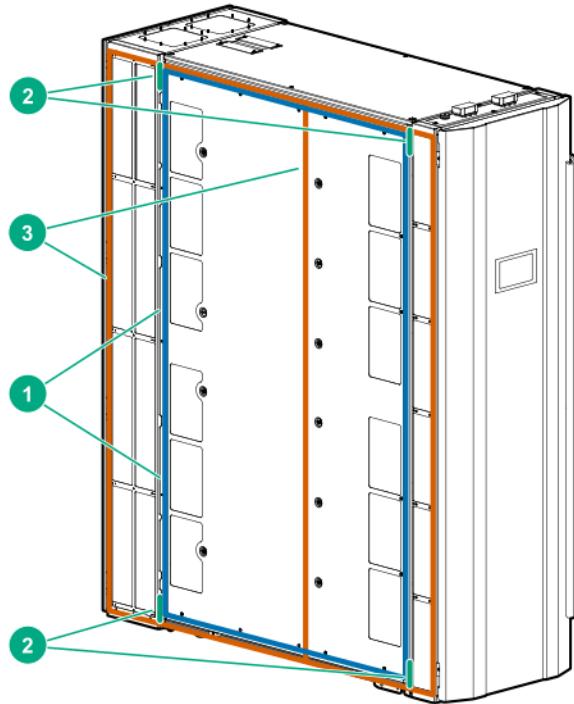
Baying the racks together

Use the foam gasket included in the HPE ARCS Air Rack Accessory Kit and the sealing tape included in the HPE ARCS Air Rack Installation Kit to bay the HPE Adaptive Rack Cooling System and HPE ARCS 42U/48U 600x1600mm Racks together to prevent loss of air pressure within the system. Start the installation at the HPE Adaptive Rack Cooling System and work outwards in both directions to the end of the row.

For more information on accessory and option kits, see [**Accessory and option kit contents**](#).

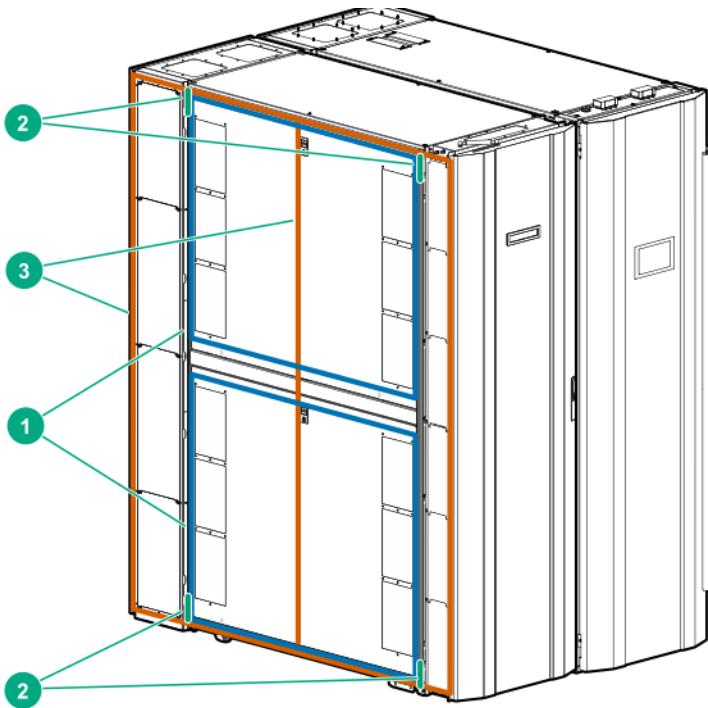
On the HPE Adaptive Rack Cooling Unit:

1. If the HPE Adaptive Rack Cooling System is on the end of a row, to seal around the panels, apply sealing tape as indicated.
2. If the HPE Adaptive Rack Cooling System is bayed to an adjacent rack, apply the foam gasket in the corners of the frame.
3. If the HPE Adaptive Rack Cooling System is bayed to an adjacent rack, apply the foam gasket around the perimeter. To separate high and low pressure, apply one central vertical strip of foam gasket.



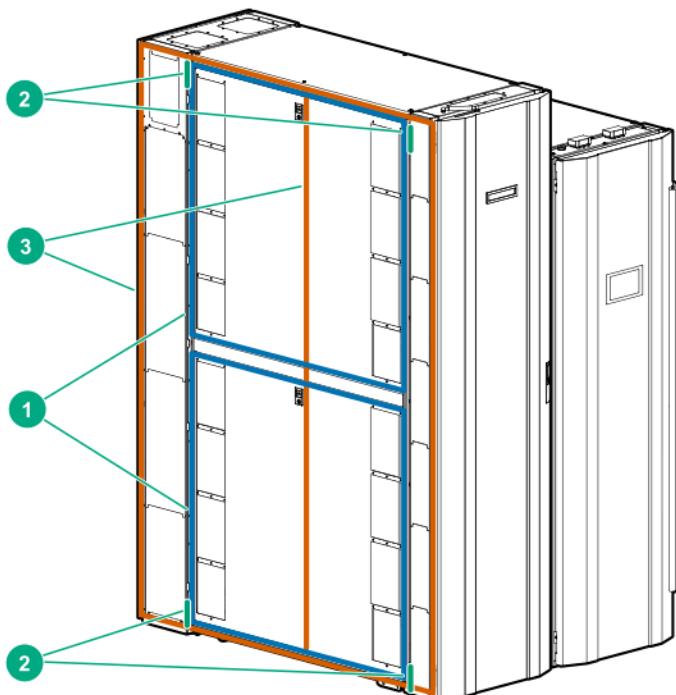
On HPE ARCS 42U 600x1600mm Racks:

1. If the HPE Adaptive Rack Cooling System is on the end of a row, to seal around the panels, apply sealing tape as indicated.
2. If the HPE Adaptive Rack Cooling System is bayed to an adjacent rack, apply the foam gasket in the corners of the frame.
3. If the HPE Adaptive Rack Cooling System is bayed to an adjacent rack, apply the foam gasket around the perimeter. To separate high and low pressure, apply one central vertical strip of foam gasket.



On HPE ARCS 48U 600x1600mm Racks:

1. If the HPE Adaptive Rack Cooling System is on the end of a row, to seal around the panels, apply sealing tape as indicated.
2. If the HPE Adaptive Rack Cooling System is bayed to an adjacent rack, apply the foam gasket in the corners of the frame.
3. If the HPE Adaptive Rack Cooling System is bayed to an adjacent rack, apply the foam gasket around the perimeter. To separate high and low pressure, apply one central vertical strip of foam gasket.



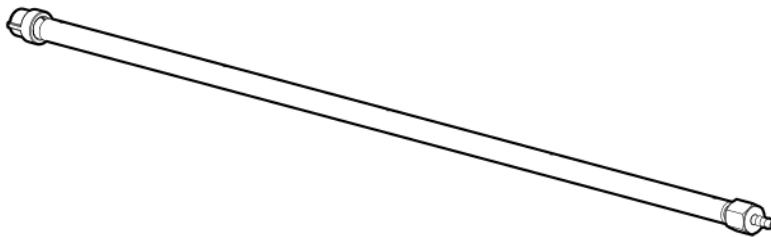
Integrating the HPE Adaptive Rack Cooling System and IT Rack

The HPE Adaptive Rack Cooling System is designed to supply the IT equipment with the proper amount of cooling airflow. The HPE Adaptive Rack Cooling System fan speeds are controlled to build a slightly positive differential pressure between the front of the IT racks and rear of the HPE Adaptive Rack Cooling System. The IT fans increase or decrease speed as the IT load requires. The HPE Adaptive Rack Cooling System control system senses increased or decreased pressure differences and adjusts fans accordingly to maintain the pressure differential set point. These actions result in a neutral environment for the IT racks, and the HPE Adaptive Rack Cooling System fans do not push more air than required across the system. For proper operation, the HPE Adaptive Rack Cooling System measures the pressure difference between the front of the IT rack and the rear of the HPE Adaptive Rack Cooling System.

HPE Adaptive Rack Cooling System pressure tube connections

During deployment, after the IT racks and the HPE Adaptive Rack Cooling System have been bayed together, connect the pressure reference pickups in the IT racks to the measurement ports on the front of the HPE Adaptive Rack Cooling System control cabinet. Then connect the pressure reference pickup in the rear of the HPE Adaptive Rack Cooling System to the measurement ports on the rear of the HPE Adaptive Rack Cooling System. There are two ports in the front and two ports in the rear of the HPE Adaptive Rack Cooling System control box.

To dampen local pressure variations and give accurate ambient pressure readings, the pressure sampling tubes consist of multiple small holes perforating a metal tube. Each tube is 18 inches long. One end is sealed and the other end has a hose barb.



Installing the pressure sampling tubes

The parts used to perform this procedure are located in the HPE ARCS Accessory Kit and the HPE ARCS Rack Chunk Installation Kit.

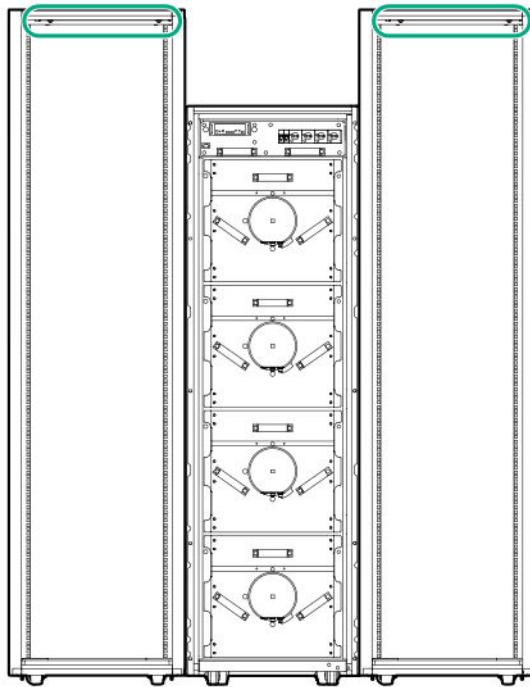
To install the pressure sampling tubes:

1. To identify the IT racks cooled by each individual HPE Adaptive Rack Cooling System, looking to the left and right of the HPE Adaptive Rack Cooling System, examine at the final HPE Adaptive Rack Cooling System and rack layout drawing. The farthest IT racks could be any of the following configurations:
 - The two IT racks on either side of the HPE Adaptive Rack Cooling System
 - One rack farther away from the HPE Adaptive Rack Cooling System on either side (four IT racks total)
 - A combination of both of the preceding configurations, with two IT racks on one side and a single IT rack on the other side.

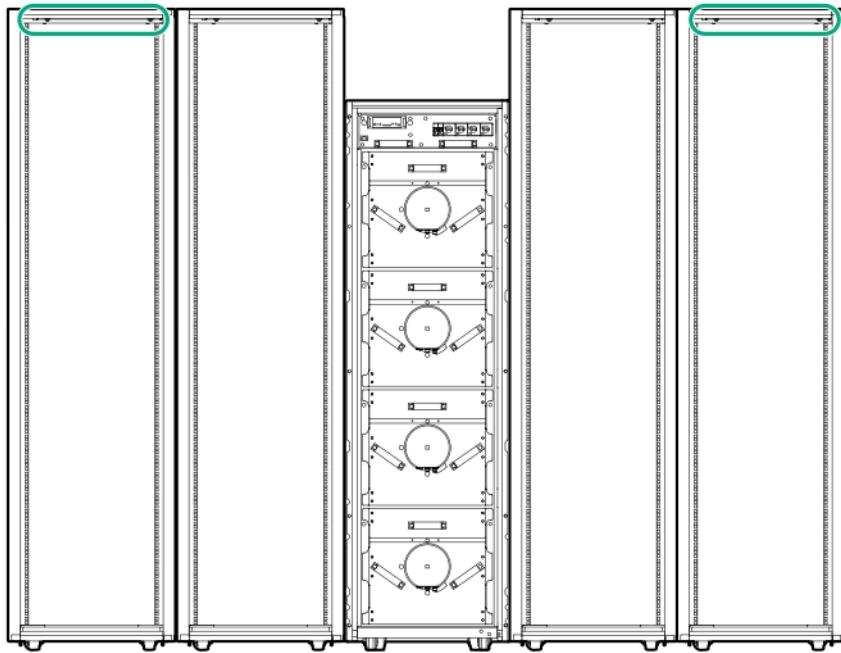
To ensure smooth control, when multiple HPE Adaptive Rack Cooling Systems are located in a row of IT equipment, do not overlap the pressure measurement zones. Connect only one set of pressure

measurement tubes to an IT rack from one HPE Adaptive Rack Cooling System. Do not connect multiple pickups to an IT rack from different HPE Adaptive Rack Cooling Systems. In the specific case of an HPE Adaptive Rack Cooling System mounted at the end of an aisle with no IT racks to one side, join the two pressure tubes for that HPE Adaptive Rack Cooling System with a tee and route it to the farthest IT rack on the side of the HPE Adaptive Rack Cooling System that is cooled by that HPE Adaptive Rack Cooling System, up to two racks away.

HPE Adaptive Rack Cooling System configured between two IT racks with each IT rack receiving a pressure tube on the cold aisle side

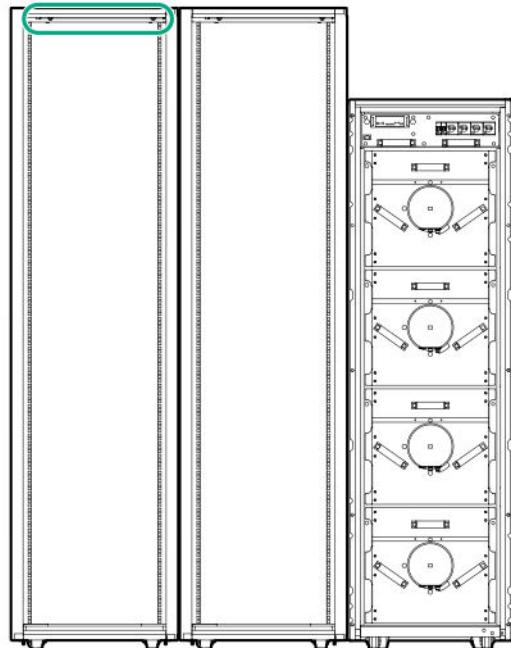


HPE Adaptive Rack Cooling System configured between four IT racks with the pressure tubes installed on the furthest outboard IT racks on either side



HPE Adaptive Rack Cooling System configured at one end of two IT racks

NOTE: For this special installation, join hose barbs together and install them only on the farthest rack from the HPE Adaptive Rack Cooling System (left rack in this illustration). Purchase an extra Y-connection for this installation.

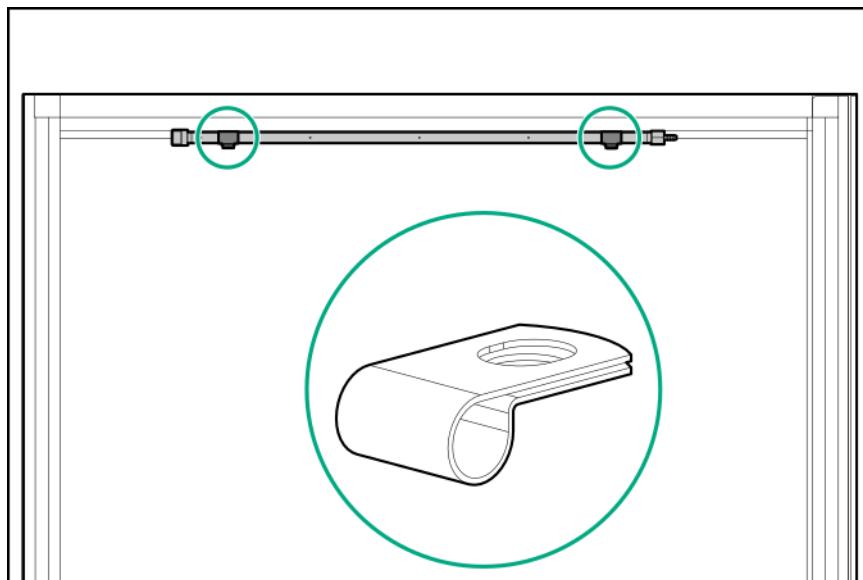


2. Install the pressure pickup tubes on the top of the extension in the IT racks identified in step 1.

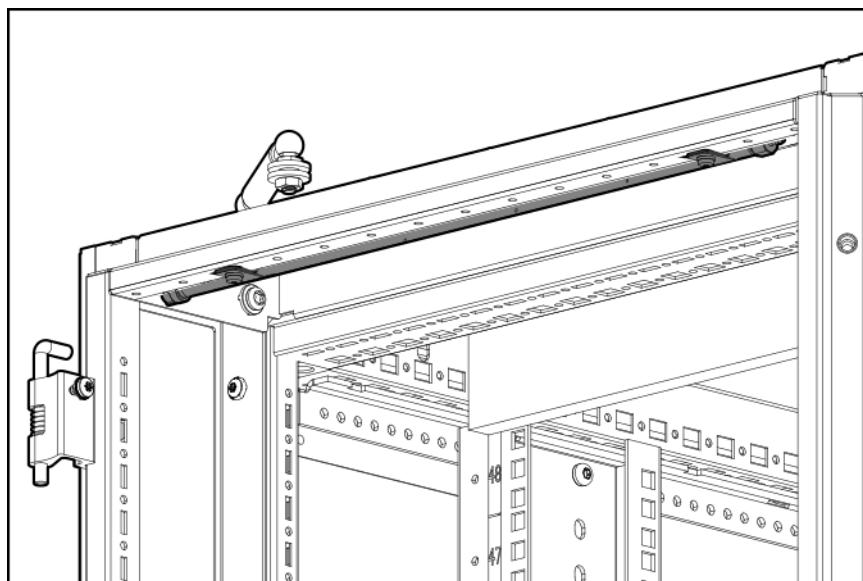
- Use two hose clamps to install each tube.
- Orient the hose barb toward the HPE Adaptive Rack Cooling System that is cooling that rack.

NOTE: The barbs on the hose must face toward the HPE Adaptive Rack Cooling System.

You might need to bend the assembly up slightly for IT clearance on installation.

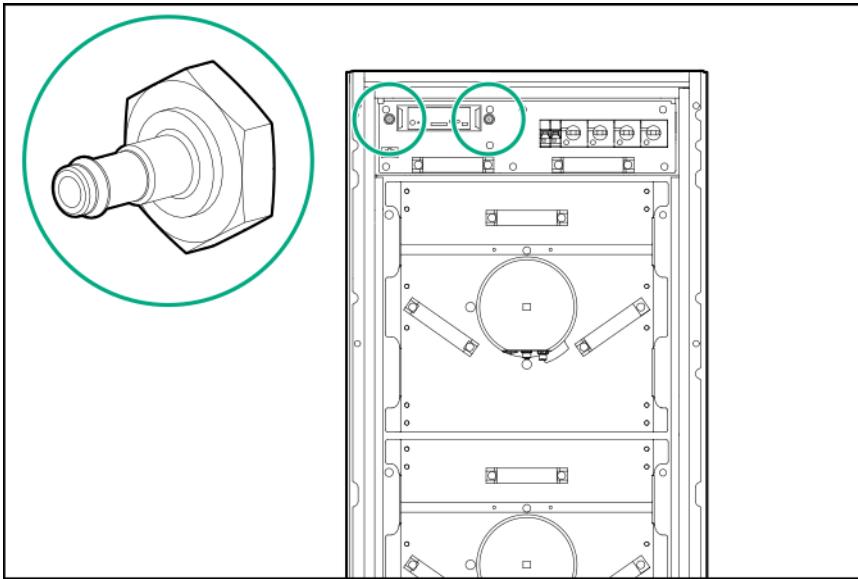


- Position port holes horizontally with one side facing the IT rack and the other side facing the extension.

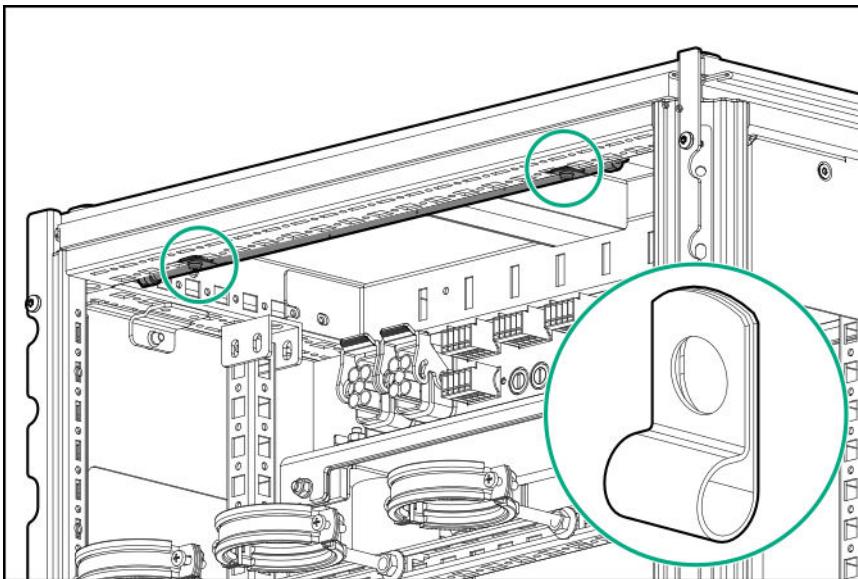


3. Connect the HPE Adaptive Rack Cooling System to the pickups in the IT racks with flexible tubing. When facing the HPE Adaptive Rack Cooling System from the front (fans showing), the pressure reference ports are located in the upper-left side of the control box at the top of the HPE Adaptive Rack Cooling System.

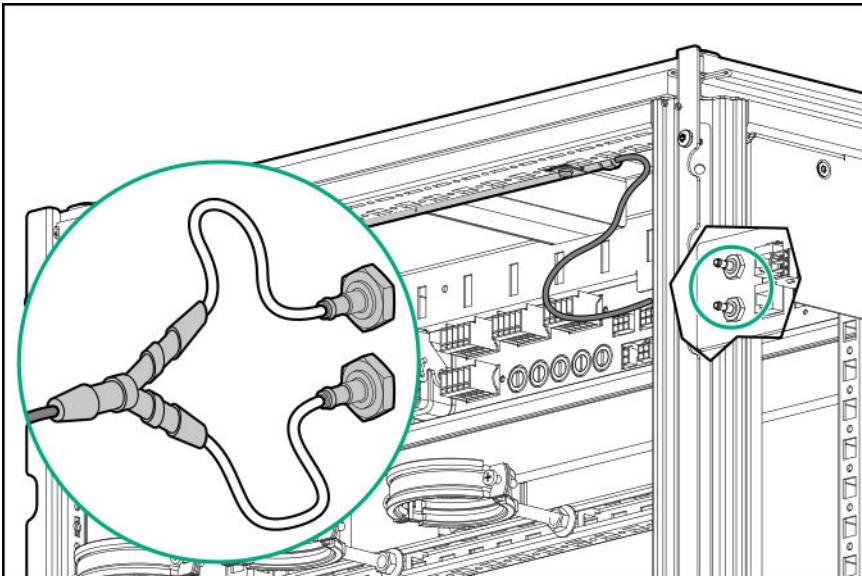
- Connect Port 1 (DP1—left port) to the rack on the left side of the HPE Adaptive Rack Cooling System.
- Connect Port 2 (DP2—right port) to the rack on the right side of the HPE Adaptive Rack Cooling System.



4. Secure the tubing between the port on the HPE Adaptive Rack Cooling System and the final connection in the IT rack.
5. Mount the rear HPE Adaptive Rack Cooling System pressure pickup tube with the hose barb facing right.



6. On the rear of the HPE Adaptive Rack Cooling System, join the two reference ports with a section of the tubing and a Y-connector.
7. Connect the HPE Adaptive Rack Cooling System reference ports to the pressure pickup tube.



8. Install side panels at the end of each row of racks. For more information on installing side panel blanks, see [Installing the side panel blanks on the IT racks](#).

Configuring the unit

The HPE Adaptive Rack Cooling System design allows monitoring and management through an Ethernet network interface. Configure basic configuration and operational set points on the front panel display. Configure basic and advanced parameters remotely using a web user interface. When an HPE Adaptive Rack Cooling System is first installed, you must configure the network on the unit. The following steps detail how to set up the HPE Adaptive Rack Cooling System on the facility network, defaulting to DHCP or setting up a static IP address and how to access the web user interface.

Ethernet setup:

Access and change the HPE Adaptive Rack Cooling System Ethernet settings using any of the following methods:

- DHCP
- Factory default IP address and the web interface
- Serial console interface on the CMC unit on the front of the HPE Adaptive Rack Cooling System

The network connection for the HPE Adaptive Rack Cooling System is located on the rear of the unit at the top of the unit next to the transfer switch.

1. You can access the HPE Adaptive Rack Cooling System web interface by default in the following ways, depending on the facility network.
 - If a DHCP server is available on the network, the HPE Adaptive Rack Cooling System defaults to DHCP. The front panel of the HPE Adaptive Rack Cooling System shows the assigned IP address on the information screen.
 - If DHCP is not available on the network, the HPE Adaptive Rack Cooling System defaults to the IP address 192.168.0.190. To view the web interface, use a PC configured with the appropriate IP settings.

- a. Once the initial Ethernet connection is complete, access the web interface using a supported browser and one of the following URLs:

http://ipaddress

- or-

https://ipaddress

(where ipaddress is the IP address of the management module).

NOTE: Supported browsers are:

- Google Chrome, version 47 or later
- Microsoft Internet Explorer, version 11 or later
- Mozilla Firefox, version 42 or later

The default login to the web interface is:

- Username: **admin**
- Password: **admin**

- b. To access HPE Adaptive Rack Cooling System settings, select the configuration tab on the right side of the screen. The admin password can be changed using the button on upper right side of webpage. A few of the pertinent menu options for initial setup are:

- TCP/IP settings allow selection of DHCP or setup of static IP address.
- The HTTP menu enables or disables the web interface and HTTP/HTTPS selection.
- Console settings allow disabling or enabling of SSH and Telnet console access.
- The Users menu under Security allows the admin to change user access levels and passwords.

2. If the HPE Adaptive Rack Cooling System Ethernet interface is not enabled or the network port cannot be accessed, access the HPE Adaptive Rack Cooling System serially through the mini-USB port on the front of the CMC to set up the Ethernet port for web access. The CMC contains an internal serial to USB adapter. To communicate to the unit, use the following settings with a serial console program.

- **Bits per Second:** 9600 (needs verification)
- **Data bits:** 8
- **Parity:** none
- **Stop bits:** 1
- **Flow control:** none
- **Username (default):** admin
- **Password (default):** admin

Once logged in, you can enable the port and configure the IP information. Use the web interface to complete further detailed setup.

- a. The **Network Configuration** menu contains all the networking options. The **Network Info** menu shows the current configuration.

Main Menu

```
> 1 Network Configuration <
  2 Network Info Page
  3 System Info Page
  4 Console Commands
  5 Set Configuration
```

- b. The **Network Configuration** menu contains networking and security settings. The **IPv4** menu contains IP address settings and the enable/disable DHCP setting. The **Security** menu contains settings to allow access to http, https, or both. After changes are made, use the **G** menu option to return to the network configuration menu and reboot the HPE Adaptive Rack Cooling System.

Menu Network Configuration

```
> 1 IPv4 Configuration <
  2 IPv6 Configuration
  3 DNS Configuration
  4 LDAP Configuration
  5 Radius Configuration
  6 Modbus/TCP Configuration
  7 Settings Ethernet Port      >Auto<
  8 System Name                >HPE Adaptive Rack Cooling System<
  9 System Contact             >Your administrator<
  A System Location            >Room 123 Building ABC<
  B Actual Date                >26.02.1970<
  C Actual Time                >20:08:41<
  D Beeper                     >Disabled<
  E Security
  F SNMP Configuration
  G Reboot Unit                >No<
ESC=End
```

IPv4 Configuration

Installing the option kits

There are several option kits available for use with the HPE Adaptive Rack Cooling System. For more information about option kits, see [Accessory and option kit contents](#).

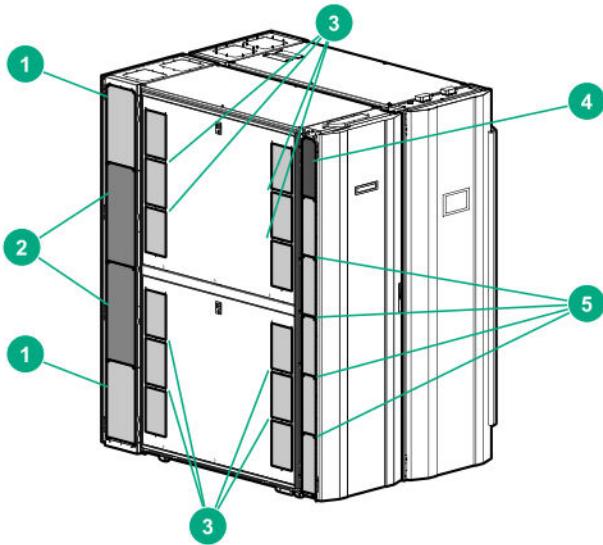
Installing the side panel blanks on the IT racks

To close off the racks at the end of a row, install side panel blanks on the IT racks. Installing the blanks isolates the racks from the room environment.

NOTE: The following illustrations show panel installation on the left row end. Installation on the right row end is the same but in mirror image.

Installing side panel blanks on a 42U IT rack

The HPE ARCS 42U Air Rack Installation Kit is for 42U racks and includes the following side panel blanks.

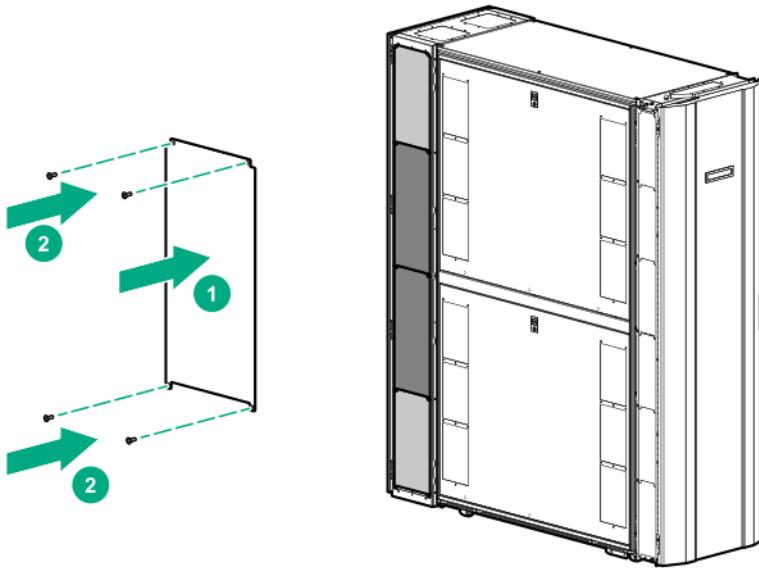


Item	Description
1	4 small side panel blanks for the rear extension
2	4 large side panel blanks for the rear extension
3	24 rack side panel blanks
4	2 "Panel D" side panel blanks for the front extension
5	10 "Panel B" side panel blanks for the front extension

For more information on the HPE ARCS 42U Air Rack Installation Kit contents, see [**Accessory and option kit contents**](#).

To install the rear extension blanks:

1. Place the blank against the IT rack, and line up the screw holes.
2. Install four screws to hold the blank in place.

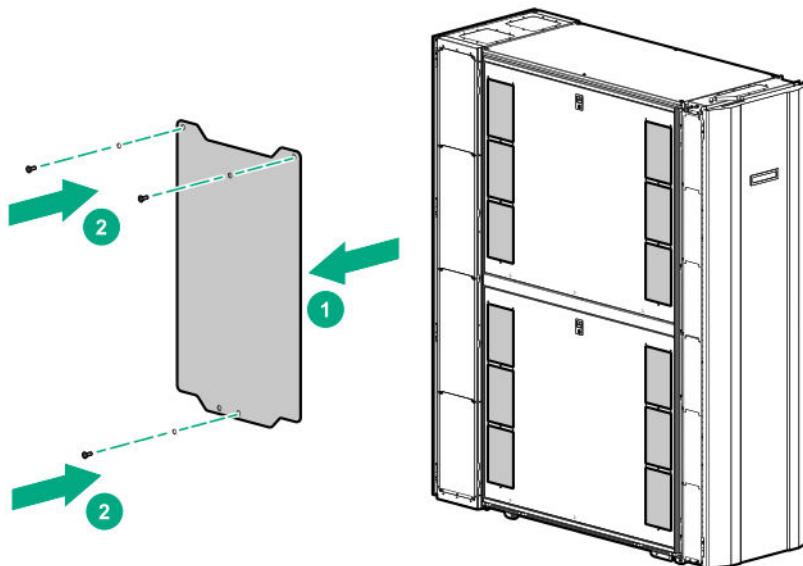


3. Repeat steps 1 and 2 for each additional rear extension blank.

To install the side panel blanks:

NOTE: If the HPE Adaptive Rack Cooling System is at the end of the row, side panel blanks must be installed from the outside, as shown in the previous illustration.

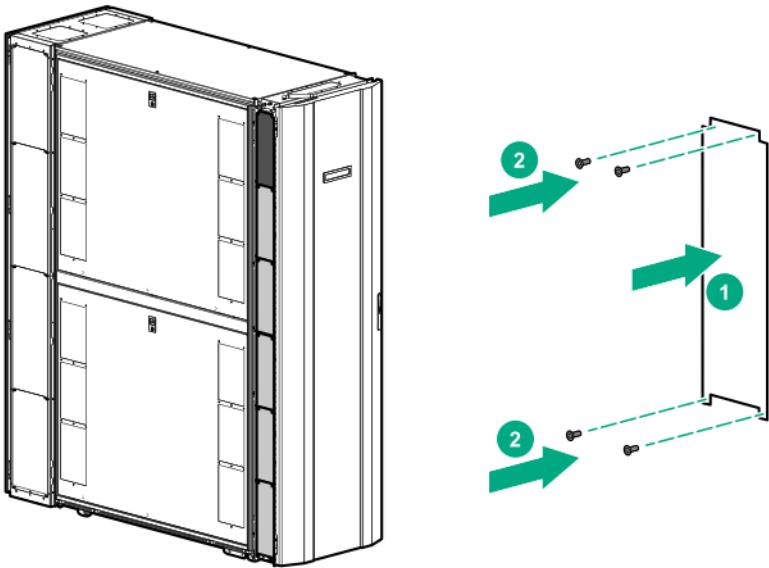
1. From the inside of the HPE Adaptive Rack Cooling System, place the blank against the IT rack, and line up the screw holes.
2. Install three screws to hold the blank in place.



3. Repeat steps 1 and 2 for each additional side panel blank.

To install the front extension blanks:

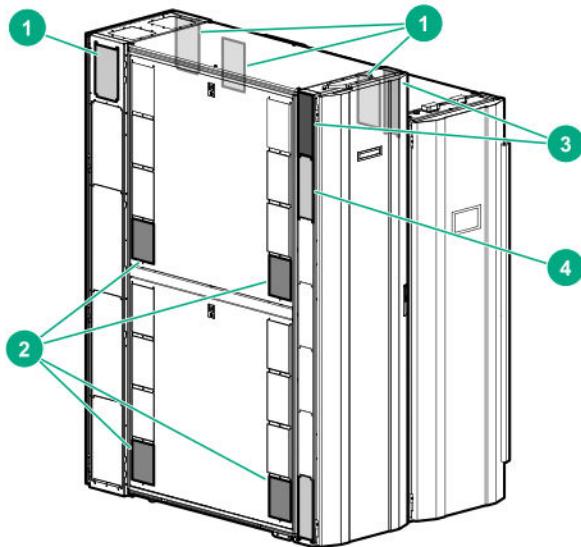
1. Place the blank against the IT rack, and line up the screw holes.
2. Install four screws to hold the blank in place.



3. Repeat steps 1 and 2 for each additional front extension blank.

Installing side panel blanks on a 48U IT rack

The HPE ARCS 48U Air Rack Installation Kit is for 48U racks and includes the following side panel blanks.



Item	Description
1	8 rack side panel blanks
2	8 Rack side panel blanks, 48U

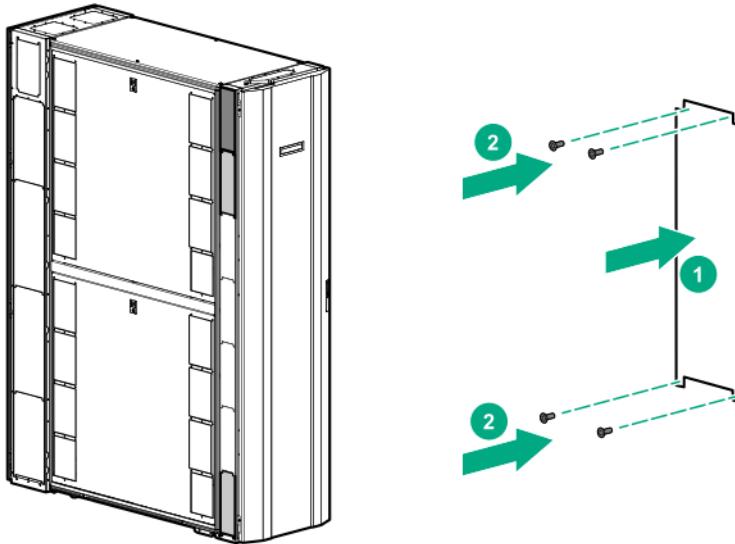
Table Continued

Item	Description
3	4 "Panel C" side panel blanks for the front extension
4	4 "Panel A" side panel blanks for the front extension

NOTE: You also need the HPE ARCS 42U Air Rack Installation Kit to complete the panel installation. For more information on the HPE ARCS 42U & 48U Air Rack Installation Kit contents, see [Accessory and option kit contents](#).

To install the front extension side panel blanks:

1. Place the blank against the IT rack, and line up the screw holes.
2. Install four screws to hold the blank in place.

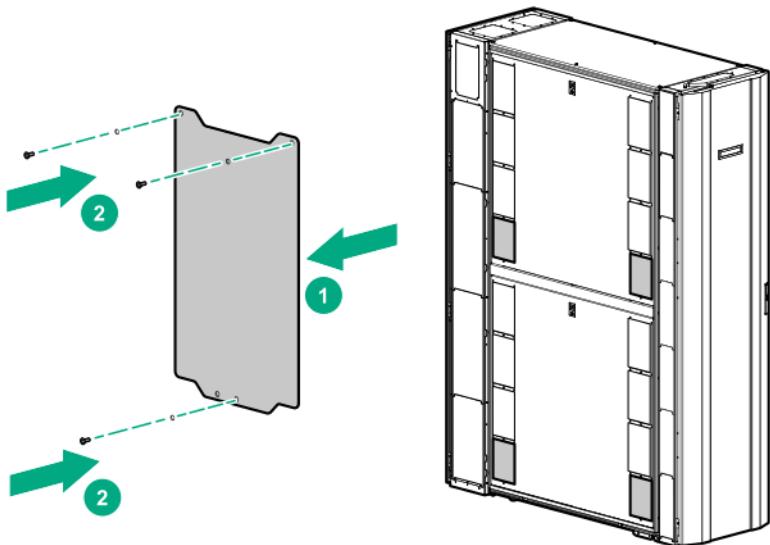


3. Repeat steps 1 and 2 for each additional front extension side panel blank.

To install the side panel blanks:

NOTE: If the HPE Adaptive Rack Cooling System is at the end of the row, side panel blanks must be installed from the outside, as shown in the previous illustration.

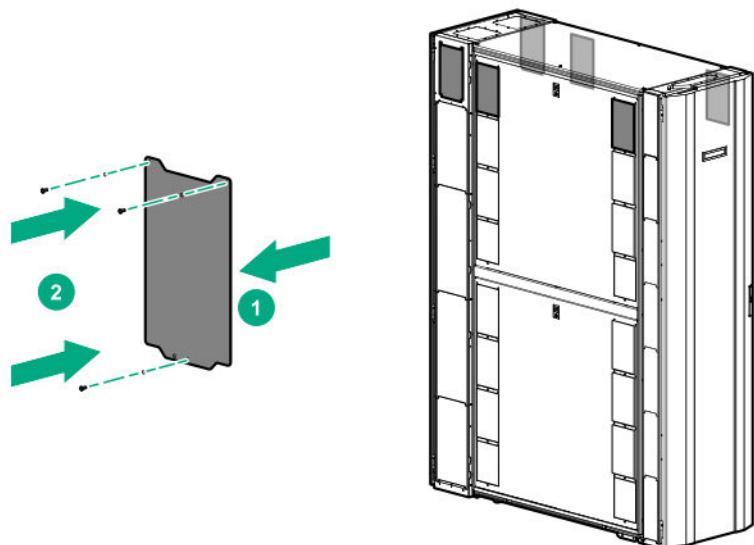
1. From the inside of the HPE Adaptive Rack Cooling System, place the blank against the IT rack, and line up the screw holes.
2. Install three screws to hold the blank in place.



3. Repeat steps 1 and 2 for each additional side panel blank.

To install the top 6U blanks:

1. From the inside of the HPE Adaptive Rack Cooling System, place the blank against the IT rack, and line up the screw holes.
2. Install three screws to hold the blank in place.



3. Repeat steps 1 and 2 for each additional top 6U blank.

Installing the HPE ARCS Auto Door Release Kit and HPE ARCS Auto Door Controller Kit

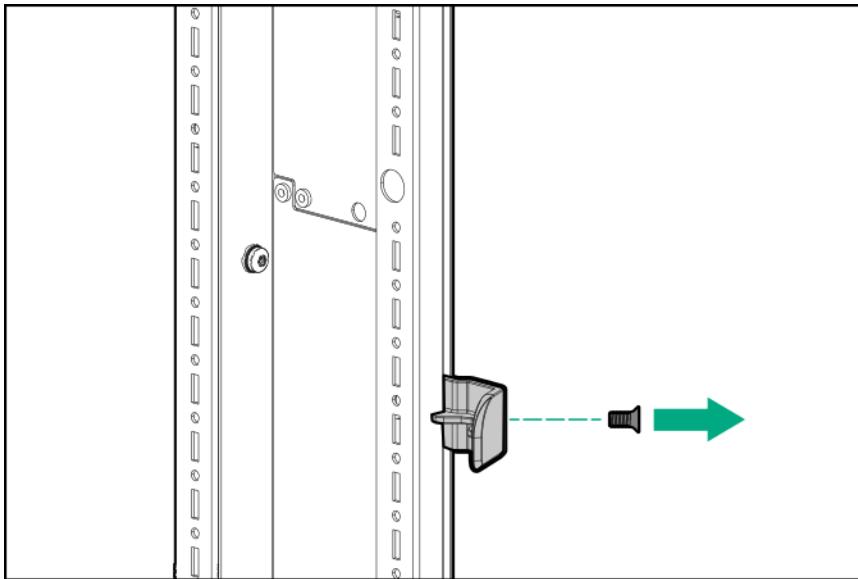
To allow the HPE Adaptive Rack Cooling System doors to automatically open when customer-defined temperature set points are exceeded, install the HPE ARCS Auto Door Release Kit and the HPE ARCS Auto Door Controller Kit. Both kits must be purchased for the system to work properly. For more information on temperature set points, see the *HPE Adaptive Rack Cooling System Web Interface Guide*.

For more information on the HPE ARCS Auto Door Release Kit and HPE ARCS Auto Door Controller Kit contents, see [Accessory and option kit contents](#).

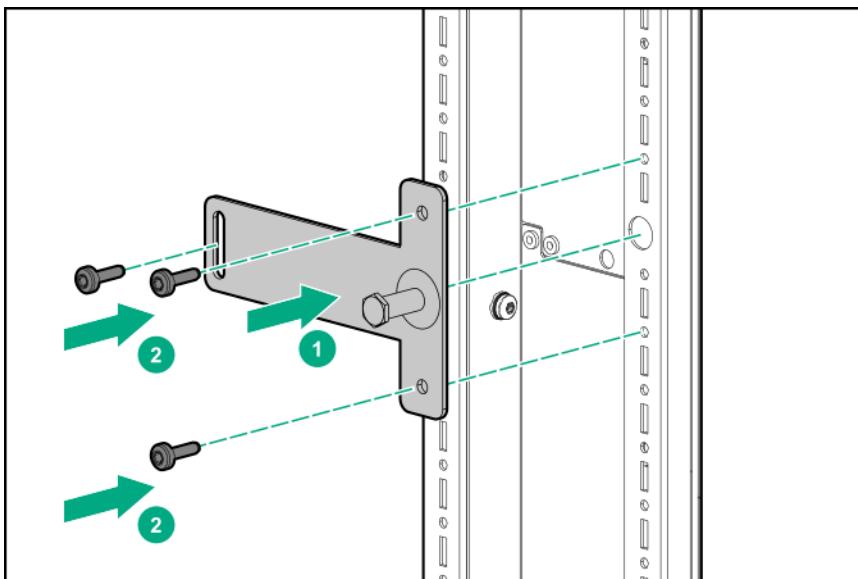
NOTE: To install these option kits, a rack PDU plug must be available for a C13/C14 power cable to be installed. One c13 PDU outlet is required.

To install the HPE ARCS Auto Door Release and Controller Kits:

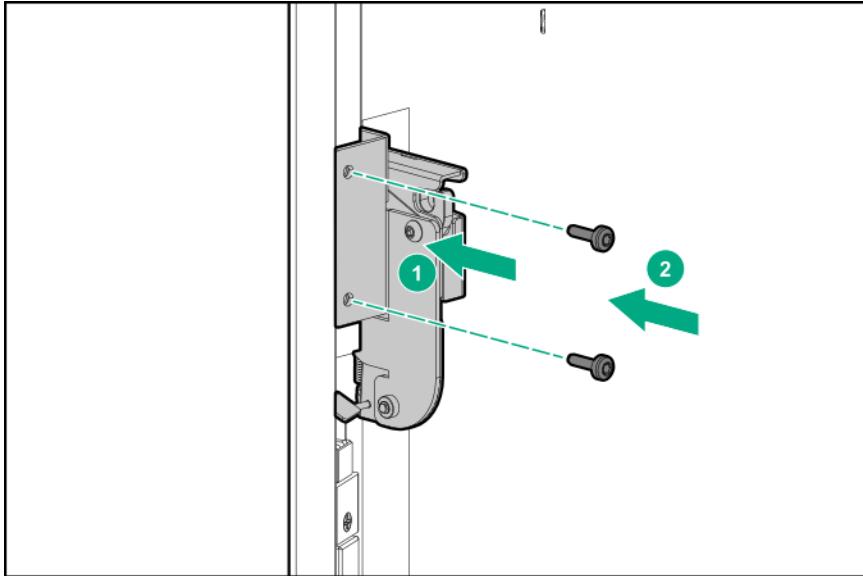
1. Remove the existing striker plate from the front door.



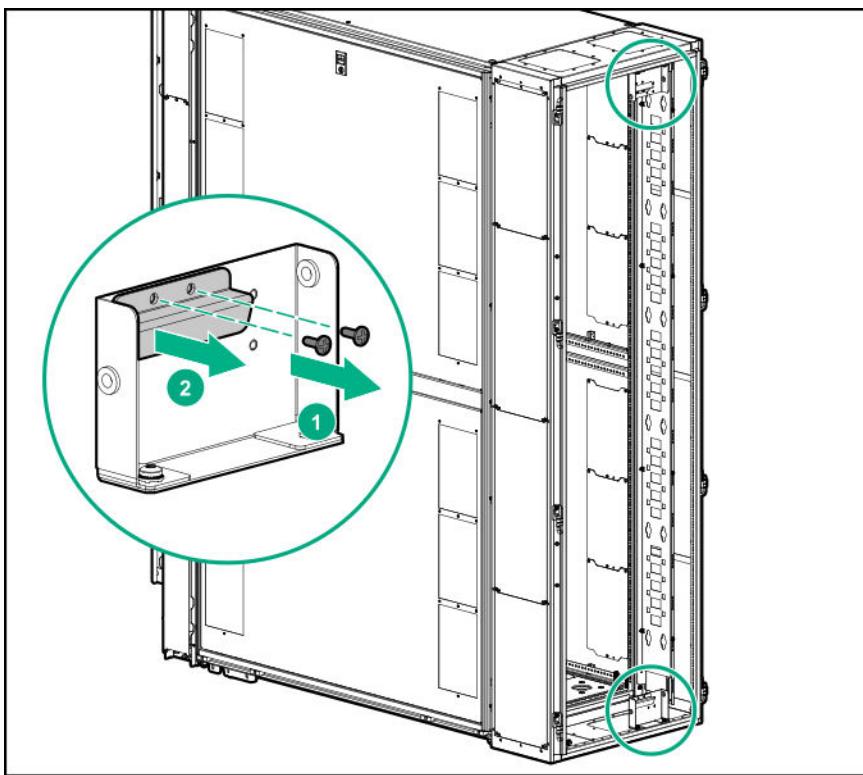
2. Align the new striker assembly with the large reference hole on the front extension. Then use the set of three M5.5X10 Torx pan head tap screws that are included with the kit to install the striker assembly.



3. Align the front door latch assembly with the screw holes on the front door. Ensure that the actuating pin is under the door latch. Then use two 1/4-20 button head screws to install the front door latch assembly.

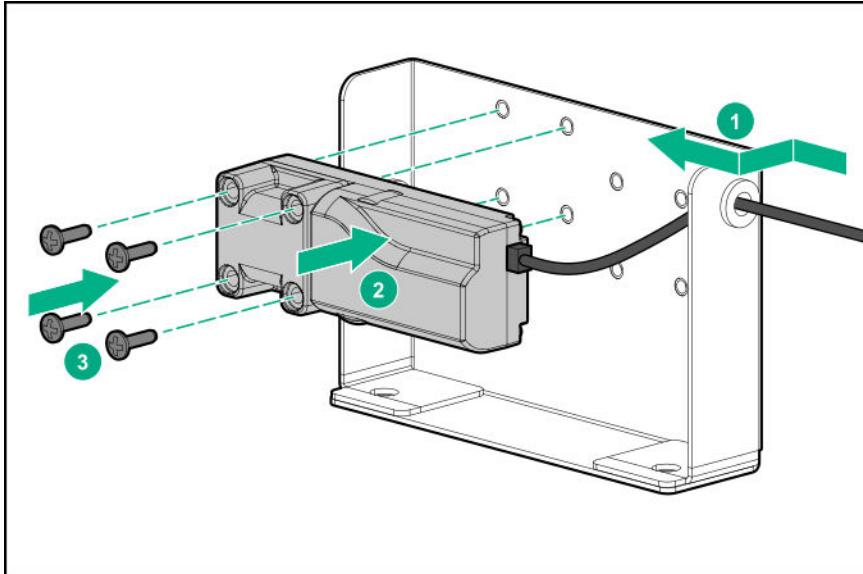


4. Remove the existing striker plates from the top and bottom of the rear door.



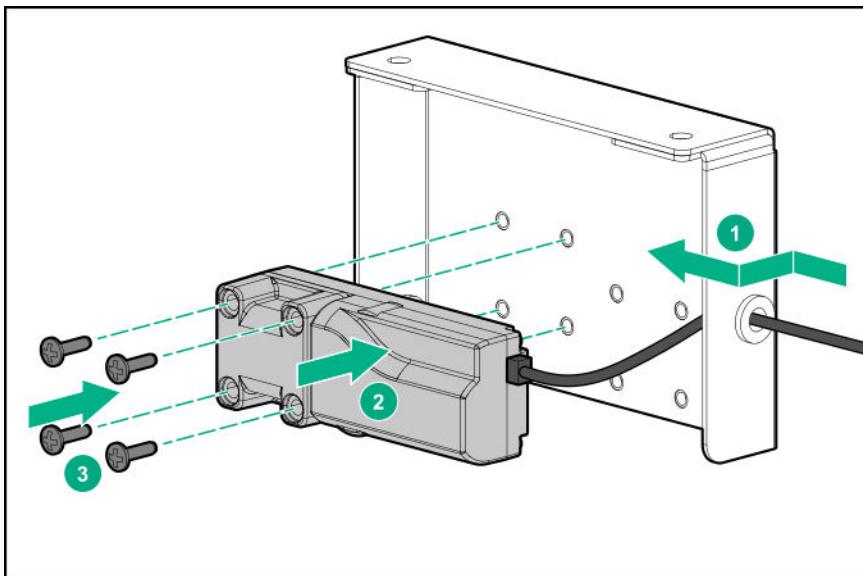
5. Install the lower rear door latch assembly:

- Route the auto door harness cable through the hole and connect it to the rear door latch assembly.
- Align the rear door latch assembly with the screw holes.
- Use four rear lock mount screws to install the rear door latch assemblies.
- To prevent electrostatic discharge damage when the door is opened, apply the tape provided in the HPE ARCS 42U Air Rack Installation Kit to the cable connection.

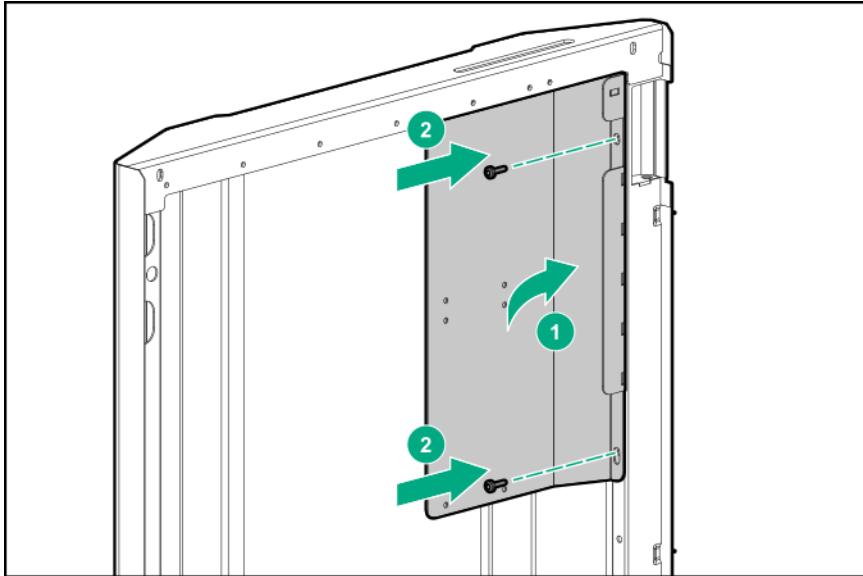


6. Install the upper rear door latch assembly:

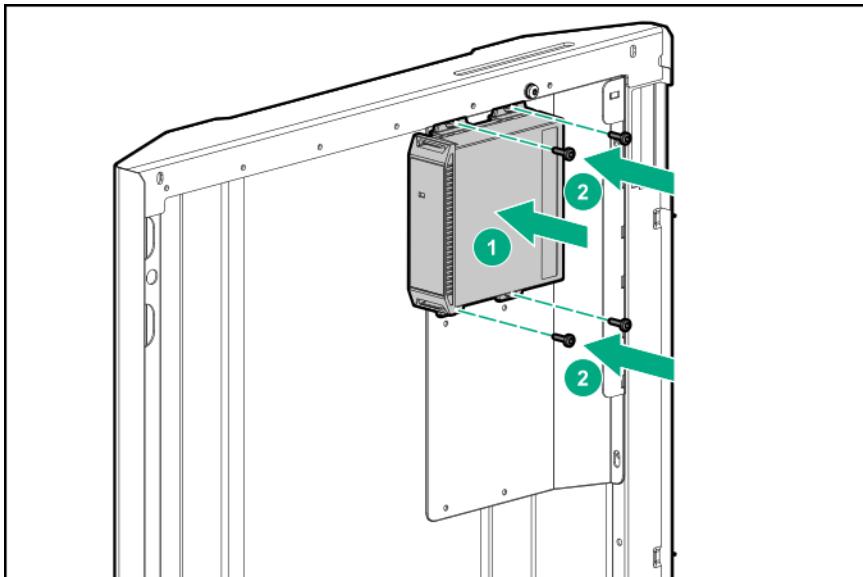
- Route the auto door harness cable through the hole and connect it to the rear door latch assembly.
- Align the rear door latch assembly with the screw holes.
- Use four rear lock mount screws to install the rear door latch assemblies.
- To prevent electrostatic discharge damage when the door is opened, apply the tape provided in the HPE ARCS 42U Air Rack Installation Kit to the cable connection.



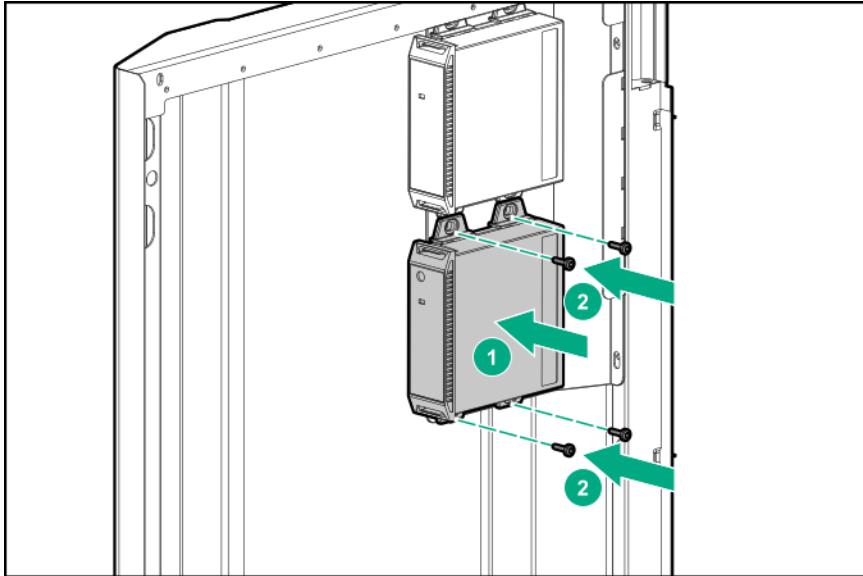
7. Align the custom mounting bracket with the screw holes on the door of the HPE Adaptive Rack Cooling System. Then use the two M5.5X10 Torx pan head tap screws that came with the kit to install the mounting bracket.



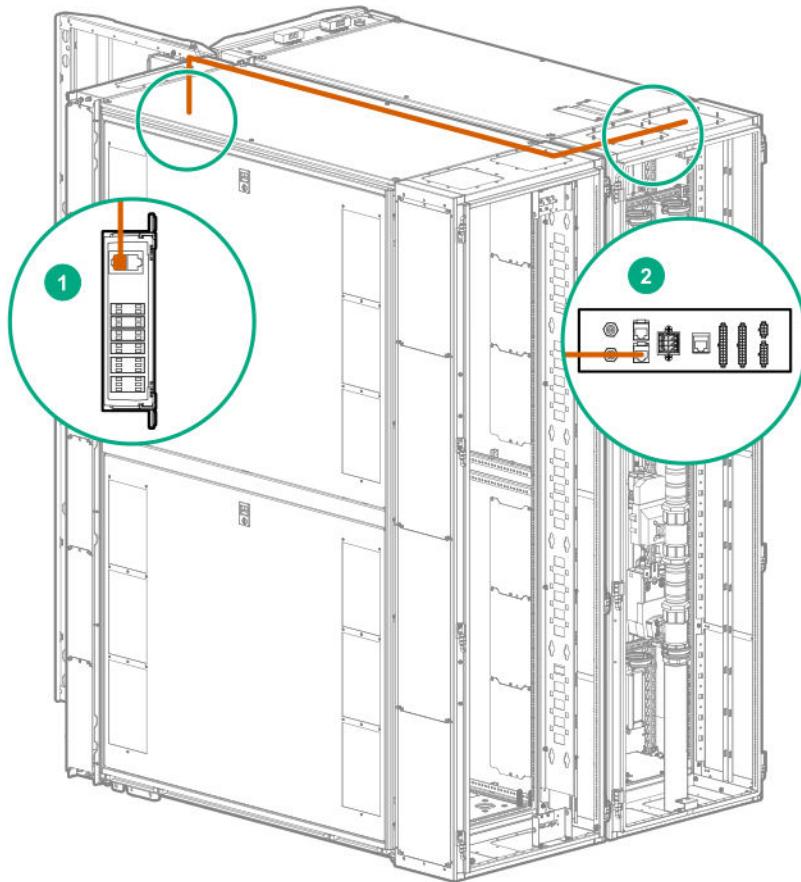
8. Align the power supply with the screw holes on the top of the mounting bracket. Then use four screws to install the power supply.



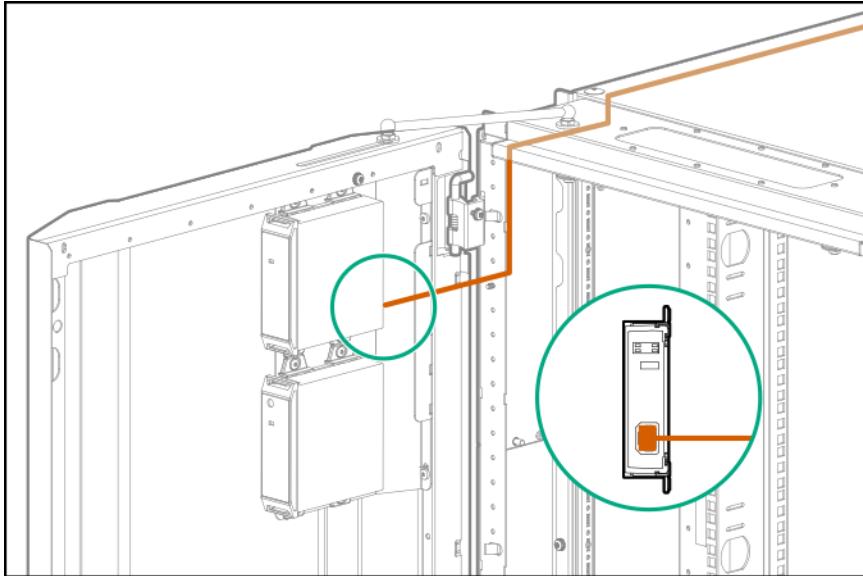
9. Align the CMC III I/O ARCS Rack Module with the screw holes on the mounting bracket underneath the power supply. Then use four screws to install the CMC III I/O ARCS Rack Module.



10. To connect the HPE Adaptive Rack Cooling System to the IT controller, connect the 5m CAN bus cable harness included in the HPE ARCS Auto Controller Kit to the CMC, and then route the cable as shown. Connect the other end to the I/O module.

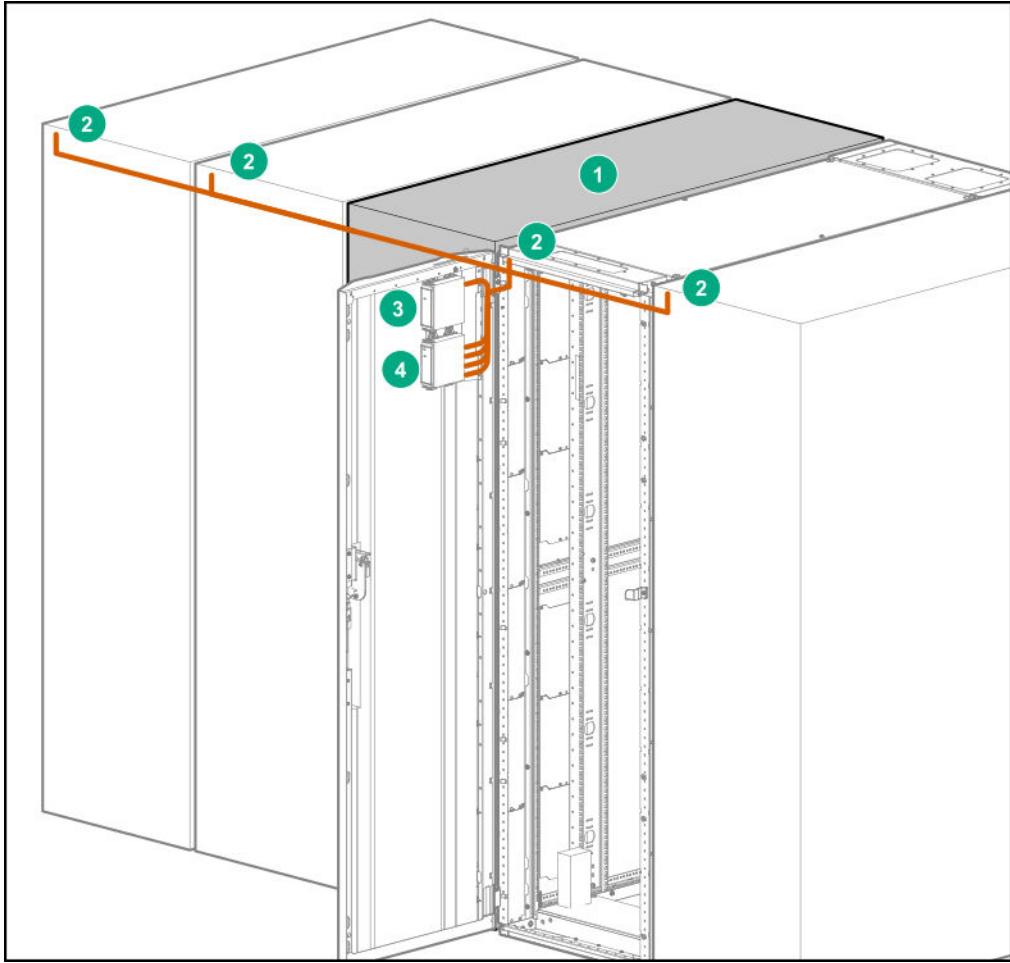


11. To connect the power supply to the power source, connect the power cord (part number 142263-005) to the power module (part number P06226-001), and then route the cable as shown. Connect the other end to your PDU.

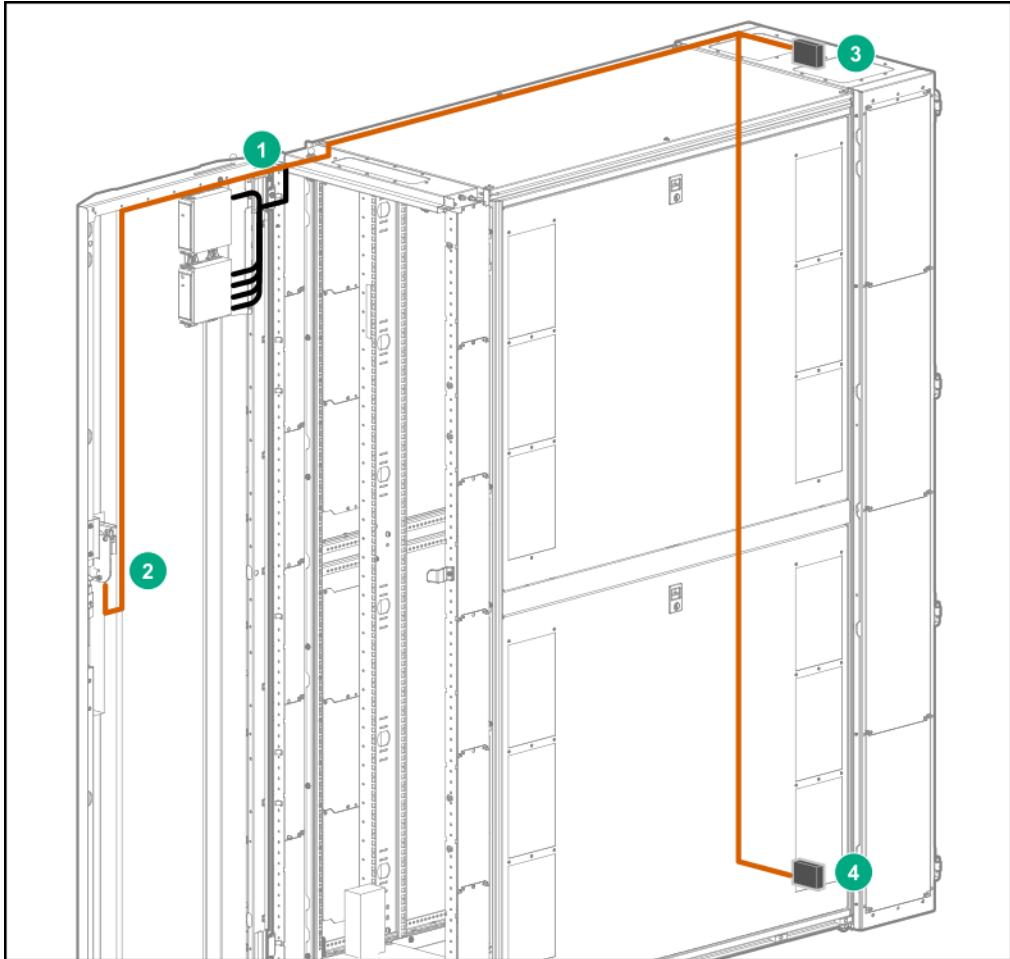


12. Connect the controller cable bundle to the I/O module as labeled on the harness.

Item	Description
1	HPE Adaptive Rack Cooling System
2	Harness coming from IT rack (part number P06225-001)
3	Power supply
4	I/O module



- 13.** To connect the auto door opening kit cables:
 - a.** Plug the cable into the IT controller.
 - b.** Route the cable across the top of the IT rack door and down to the door latch assembly.
 - c.** Route the cable across the top of the IT rack and to the upper door latch assembly.
 - d.** Route the cable along the right rear of the rack extension. Use zip ties to secure the cable. Connect the cable to the lower door latch assembly.

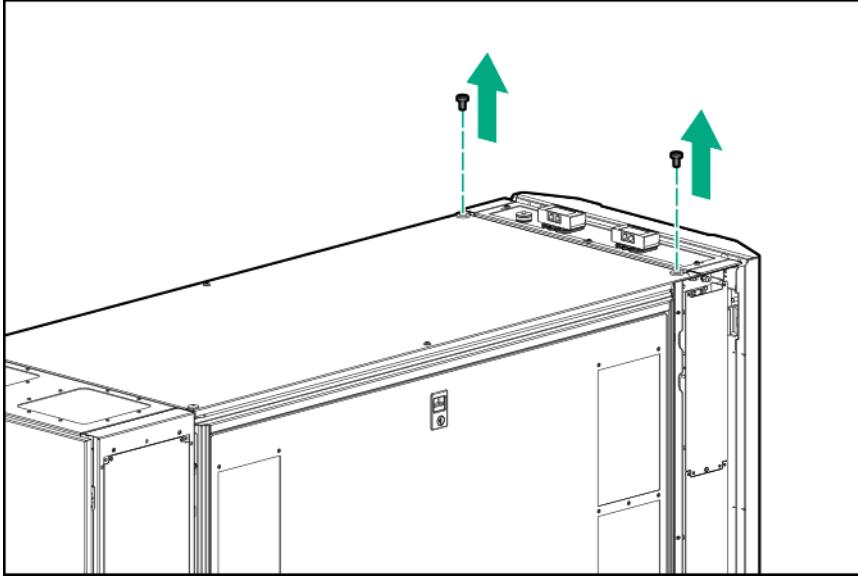


Installing the 6U Facade

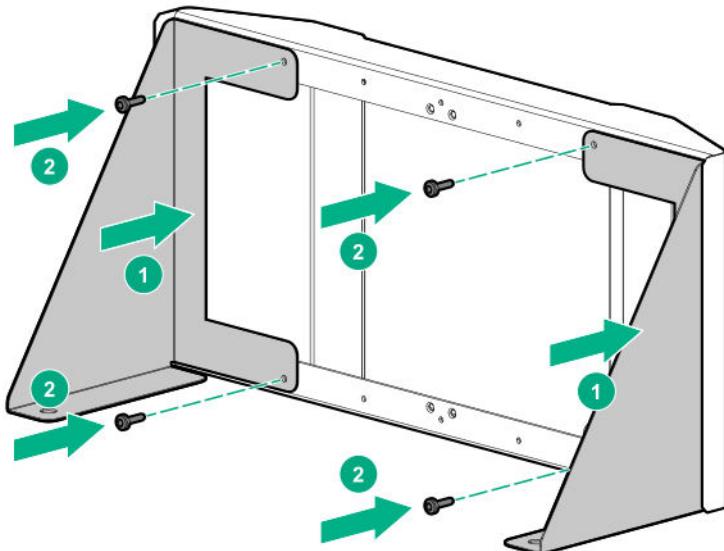
Customers with 48U IT racks might want to install the 6U Facade onto the HPE Adaptive Rack Cooling System unit. Installation of the 6U Facade is for purely aesthetic purposes. The 6U Facade comes with the HPE Apollo Air 48U Rack Installation Kit. For more information on the kit contents, see [Accessory and option kit contents](#).

To install the 6U Facade:

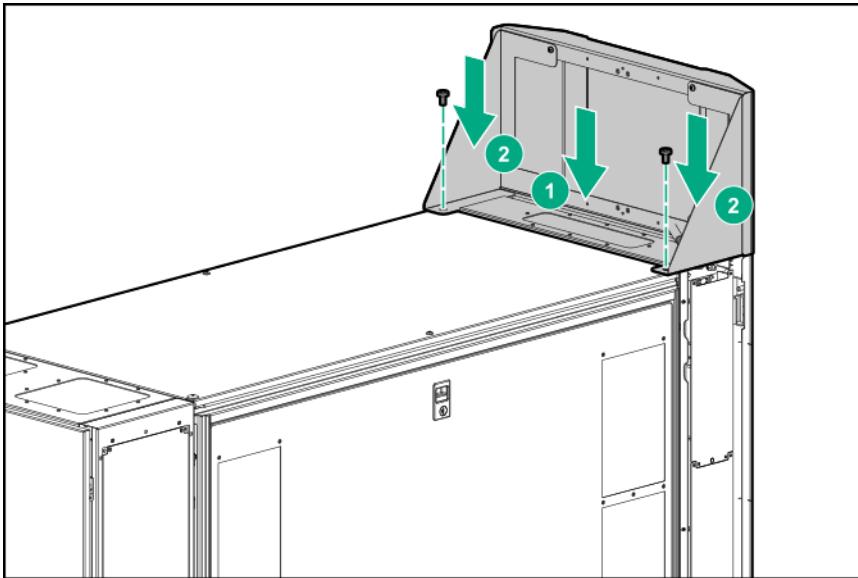
1. Unscrew and remove the two screws on the top front of the HPE Adaptive Rack Cooling System. Set the screws aside in a safe place.



2. To attach the left and right mounting brackets to the 6U facade, use the four screws included with the kit.



3. Place the 6U Facade on top of the HPE Adaptive Rack Cooling System, lining up the screw holes. Use the screws you set aside in step 1 to screw the 6U Facade into place.



Connecting to the facility water

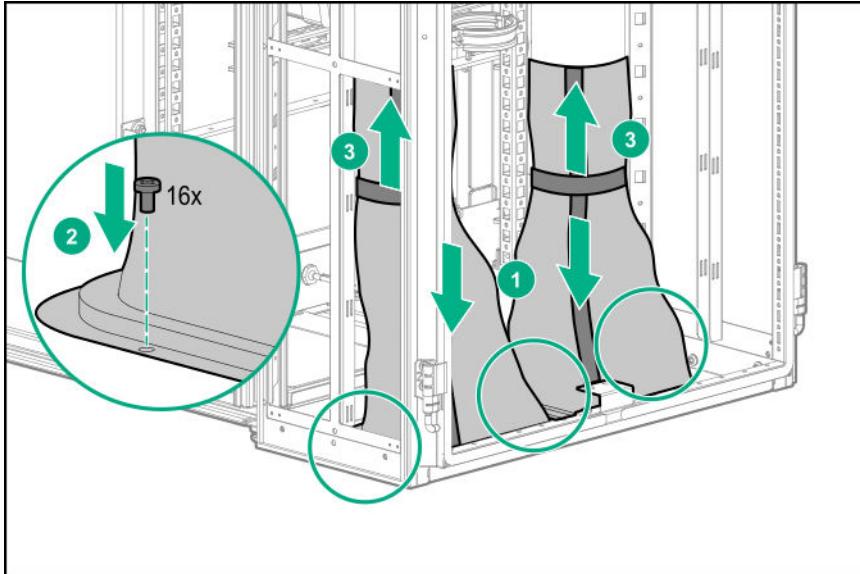
CAUTION: Water quality that is out of spec might cause decreased cooling capacity or disruption in service. The water flowing into the HPE Adaptive Rack Cooling System must meet the guidelines stated in the *HPE Adaptive Rack Cooling System Site Preparation Guide*. Damage caused by contaminated water is not covered by the HPE Adaptive Rack Cooling System warranty.

Before attaching the hoses to the HPE Adaptive Rack Cooling System, verify that the water supply and return are closed. Water that leaks into the unit can cause significant damage.

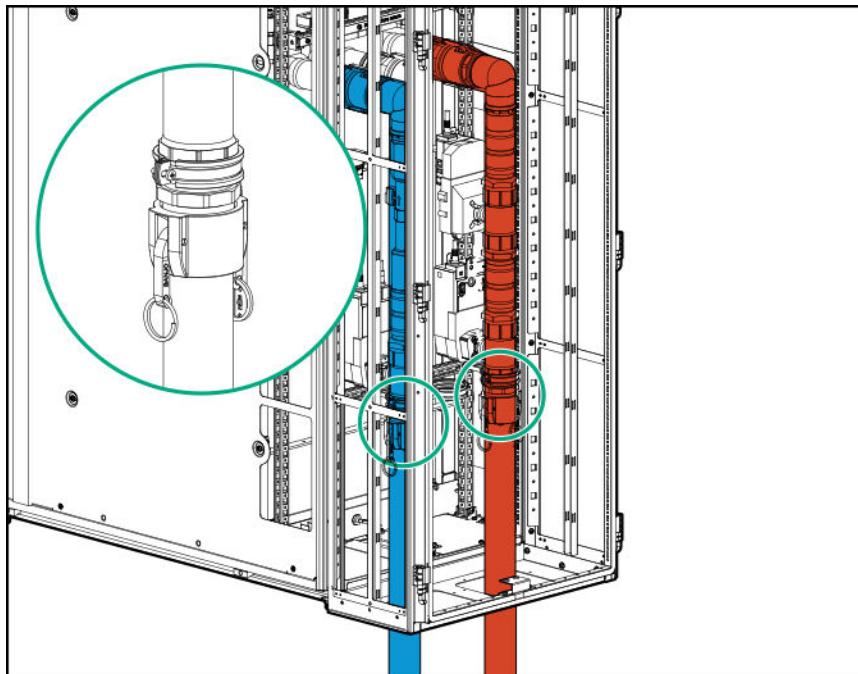
NOTE: Facility hose connections might vary by customer requirements.

NOTE: The HPE Adaptive Rack Cooling System has a failed last control state valve. During initial hookup, the control valve must be manually opened through the web interface to allow water to flow through. Isolation valves will open automatically once the HPE Adaptive Rack Cooling System is powered up.

1. Route the water hoses from either the top or bottom (depending upon site specifications), through the floor cut-out, and then install each main hose to the HPE Adaptive Rack Cooling System:
 - a. Remove the blanks from the extensions.
 - b. To install the Panduit boots for the hoses to pass through:
 - I. Slide the Panduit boot over the hose.
 - II. Install the 16 screws included with the kit.
 - III. Tighten the hook and loop strip to secure the Panduit boot to the frame of the rear extension.



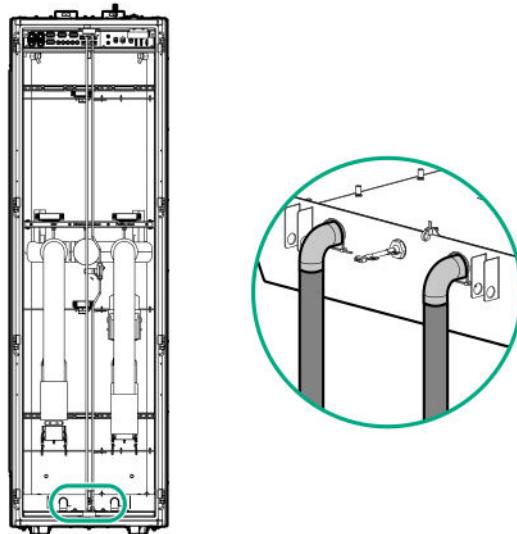
- c. Attach the 2-inch female hose coupling to the 2-inch cam and groove male coupling on the HPE HPE Adaptive Rack Cooling System. Lock into place.



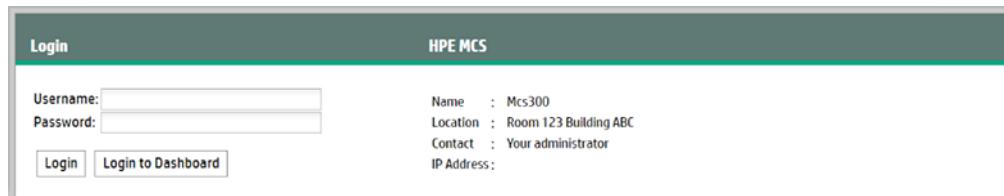
2. Route the condensate pan gravity drain and condensate pump outlet hoses to an appropriate facility drainage system.
 - a. Install any necessary extensions and route the condensate pump outlet line and gravity drain tubing to a facility drainage point.
 - b. Be sure that the facility drain connection point is lower than the condensation collection pan and that all gravity drain tubing is routed below the level of the condensation pan.

NOTE: The condensation pump drain hose is located underneath the HPE Adaptive Rack Cooling System.

- c. The following figure shows the location of the two overflow drains in the rear of the cooling unit. Each drain is a 15-mm ID tube. There is also a 15-mm ID gravity drain tube and a 0.275-in ID/0.375-in OD condensate pump drain tube. Both tubes are 1.83 m (6 feet) long. The preferred method of routing for all hoses is downward at an angle of at least 3° (pitch of 0.6 inch per 12 inches), without loops, and away from the HPE Adaptive Rack Cooling System cabinet. All hoses must be routed to a floor drain or reclamation system. The two overflow hoses are located in the HPE ARCS Accessory Kit.



3. To minimize strain on connections and to minimize operational hose dynamics, secure and support the facility water supply and return hoses as necessary.
4. Log in to the web interface:
 - a. Enter the URL: <https://ipaddress>.
 - b. Enter the user name in the User Name field. The default user name is **admin**.
 - c. Enter the password in the Password field. The default password is **admin**.



⚠ CAUTION: Once installation is complete, be sure to return the settings to **Automatic** to avoid damage to the unit. See step 11 for details.

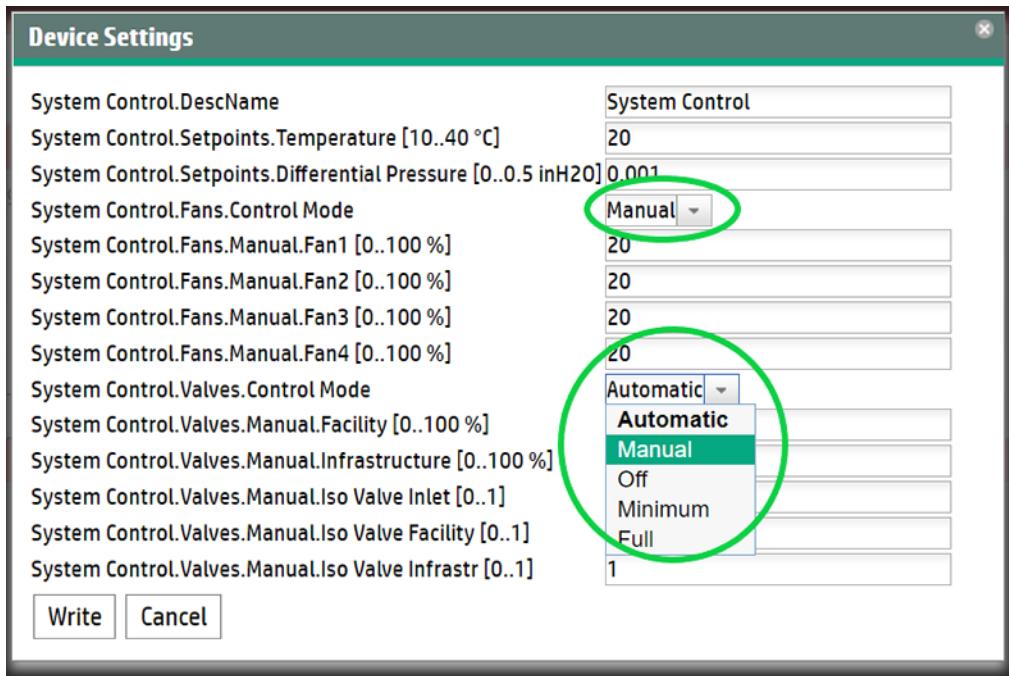
5. To open the HPE Adaptive Rack Cooling System settings tree, select the **Visualization** icon.

Hardware	Configuration	Logging	Tasks	Charts
Name	CMCIII-PU	Modular Cooling System		

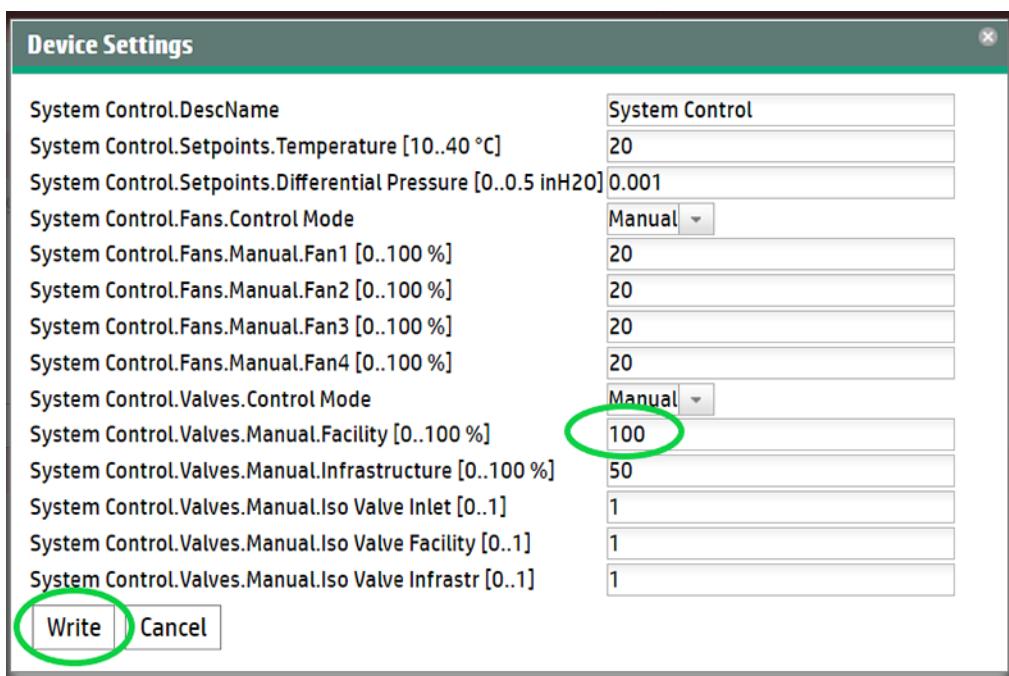
6. Select the **Device Settings** button on the **System Control** group.

Hardware	Configuration	Logging	Tasks	Charts	Dashboards
Name	Value				
CMCIII-PU					
Modular Cooling System					
Device	OK				
Modules					
Air					
Fans					
Doors					
Water					
Cooling Capacity (Cooling Capacity)	OK				
Leakage Sensors					
Input Sensors					
Condensate Pump					
AC					
System Control (System Control)	 OK				
Dew Point	Device Settings				

7. Change **System Control.Fans.Control Mode** to **Manual** and **System Control.Valves.Control Mode** to **Manual**.



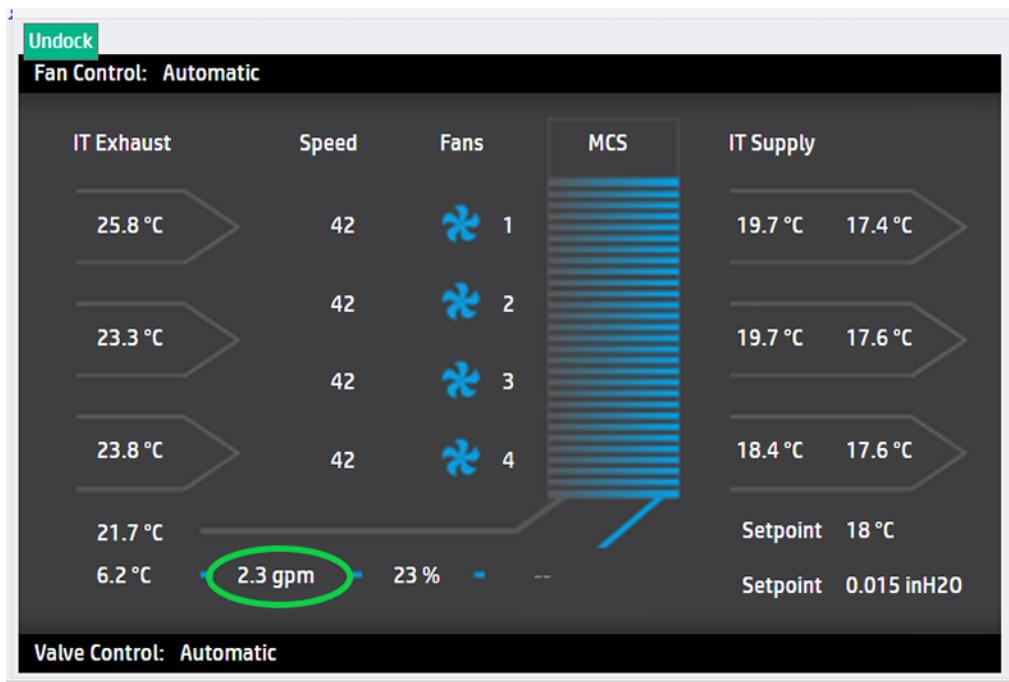
8. Change **System Control.Valves.Manual.Facility [0..100 %]** to **100** and click **Write**.



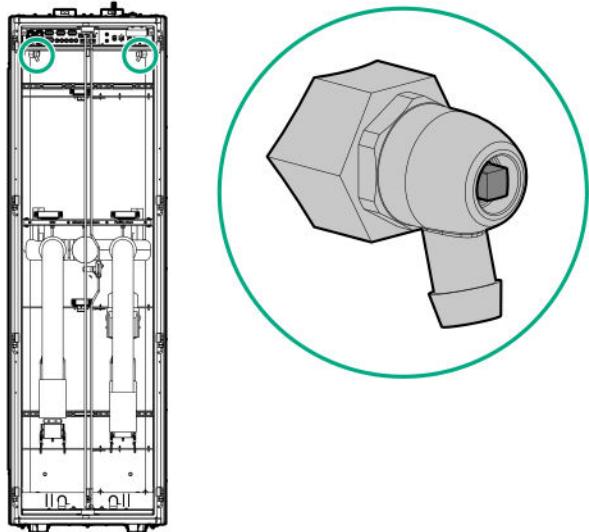
9. Return to the **Visualization** screen on the **System** menu.

Hardware	Configuration	Logging	Tasks	Charts	Dashboards
Name	Value				
CMCIII-PU					
Modular Cooling System					
Device					
Modules					
Air					
Fans					
Doors					
Water					
Cooling Capacity (Cooling Capacity)	OK				
Leakage Sensors					
Input Sensors					
Condensate Pump					
AC					
System Control (System Control)	OK				
Dew Point					

10. Verify that flow is shown in the **Visualization** screen. Be sure that flow rate is greater than 60 gpm.



11. Repeat steps 5-10, but return valves and fans to automatic operation instead of manual.
 12. If there are any manual valves on the facility lines, be sure that they are open.
 13. If necessary, use the bleeder tool from the accessory kit to open the bleeder valve and remove trapped air from the heat exchanger. To verify that the heat exchanger is bleeding correctly, be sure that a few drops of facility water pass through the tube.



The installation is complete.

Management module

Management module overview

The HPE Adaptive Rack Cooling System has a management module, which can be accessed remotely through the web interface. The management module analyzes, queries, and manages various measurements and warning and alarm messages from the unit.

The management module analyzes measurements provided by each sensor or module, generates any necessary warning or alarm messages, and then sends them to the web interface. When a new warning or alarm occurs, the warning and alarm messages appear on the operator display as well as on the web interface Alarms menu and Alarm History menu. If an alarm relay is installed on the HPE Adaptive Rack Cooling System and enabled in the appropriate web interface menu, it is also activated and an audible alarm is signaled by the internal beeper.

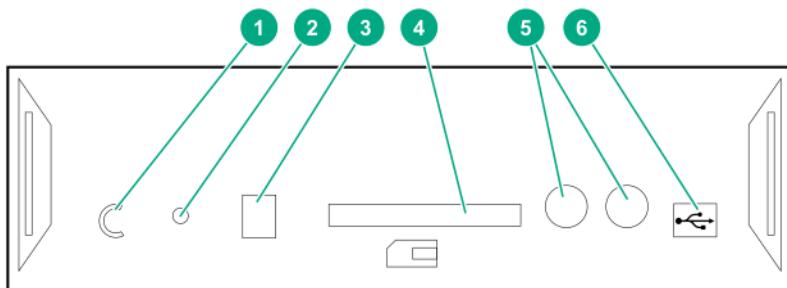
The management module performs regulation operations such as:

- Retrieving all sensor measurements at a rate of approximately once per second.
- Analyzing all measurements and generated alarm and warning messages
- Controlling fan speeds and water valve positions
- Sending various system values to the web interface

The web interface displays various measurements and warning and alarm messages from the management module. Also, various system values can be set through the web interface and sent to the management module. For more information about the web interface, see the *HPE Adaptive Rack Cooling System Web Interface User Guide*.

Management module components

The management module is on the upper left of the HPE Adaptive Rack Cooling System, behind the front door.



Item	Reference	Description
1	C key	<p>Used to confirm warnings, critical alarms, and configuration setting changes, as well as to clear the audible alarm. To confirm these situations, press and hold the C key for five seconds.</p> <p>Alternatively, click the Clear Alarms button on the Setup tab>General menu on the web interface.</p>
2	Hard reset button	<p>Used to reset the management module.</p>
3	Power/alarm LED	<p>Used to indicate the internal status of the management module, and to signal warnings and critical alarms.</p> <ul style="list-style-type: none"> • If the LED is green, the management module has power, and conditions are normal. • If the LED is green and flashing, communication is taking place. • If the LED is yellow, a warning has been issued. • If the LED is red, a critical alarm has been issued. • If the LED is flashing green, yellow, and red, then a configuration setting change has been made. To save the new configuration settings to the internal memory of the management module, press and hold the C key for five seconds. • If the LED is off, the management module has no power.
4	SD card slot	<p>Optional use. Used for HPE Adaptive Rack Cooling System data logging. For more information, see the <i>HPE Adaptive Rack Cooling System Web Interface User Guide</i>.</p>

Table Continued

Item	Reference	Description
5	Integrated infrared access sensor	Built-in infrared proximity/door sensor.
6	Mini USB connection	Used for USB connections for initial setup.

Accessing the management module through a terminal emulation program

Procedure

1. Verify that a mini-USB cable is connected between the management module and a host computer.

NOTE: Depending on your operating system, the USB connection might create a virtual serial connection on your PC.

2. Launch a terminal emulation program.

For information about configuring the management module, see the *HPE Adaptive Rack Cooling System Web Interface User Guide*.

3. Log in through the terminal emulation program.

Logging in through the terminal emulation program

Procedure

1. Enter the user name in the login field. The default user name is **admin**.
2. Enter the password in the password field. The default password is **admin**. The Main Menu screen appears.

NOTE: Passwords are case-sensitive.

Accessing the management module through the web interface

Procedure

1. Launch a supported browser. The browser window appears.
2. In the Address field (Microsoft® Internet Explorer) or the Location field (Mozilla), enter one of the following:

http://hostname[:port number]

-or-

https://hostname[:port number] (if SSL is enabled)

where *hostname* is the IP address of the management module and port number is the *port number* if using a port other than the default 80 for http and 443 for https. The login screen appears.

3. Log in through the web browser.

Logging in through the web interface

Procedure

1. Enter the user name in the User Name field. The default user name is **admin**.
2. Enter the password in the Password field. The default password is **admin**.

NOTE: Passwords are case-sensitive.

3. Choose one of the following options:

- Click **Log In**.
The HPE Adaptive Rack Cooling System web interface appears.
- To clear the credentials, click **Clear**.

Only one Admin session and one User session are supported at a time. If a second session is initiated after successful login or a console session timeout occurs, sessions can be terminated. In both situations, the existing session is terminated and the login screen appears. Admin session logins, logouts, and terminations are recorded in the Events Log menu. The console session timeout length can be enabled, disabled, or modified in the Remote Access tab. The default is 30 minutes.

Configuring the leak detection alarm relay for facility power shutdown

The connection to the alarm relays is hard wired. The ARPO cable connects to the back of the HPE Adaptive Rack Cooling System transfer switch using a Wago connector labeled "Alarm."

Operator display

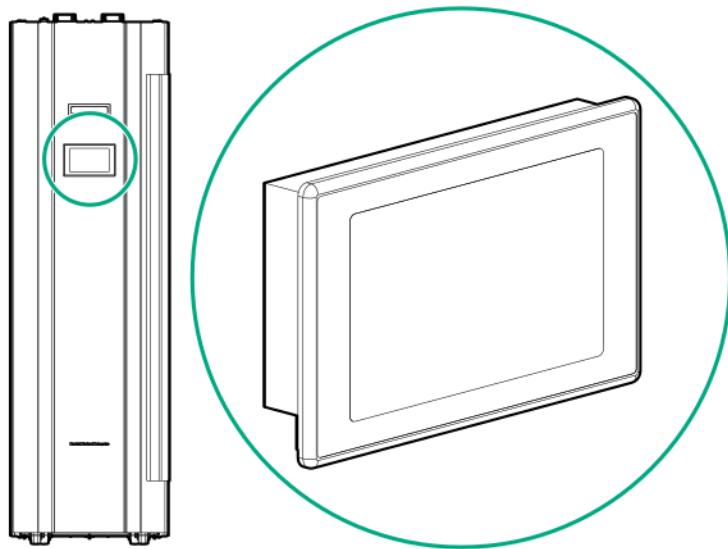
Operator display overview

The operator display provides information on the system operation, adjusts cooling set points, and is viewable on the outside of the HPE Adaptive Rack Cooling System front door. When the management module issues an alarm or warning, the messages appear on the operator display, the web interface Alarms menu, and the Alarm History menu.

Operator display components

The operator display on the front door of the HPE Adaptive Rack Cooling System unit has a digital touch-screen.

To scroll through the menu options, press the appropriate button on the bottom of the screen.



Warning and alarm messages

Warning and alarm messages are sent by the HPE Adaptive Rack Cooling System to the management module. These messages appear on the operator display and on the web interface Alarms menu and Alarms History menu.

The HPE Adaptive Rack Cooling System displays the Alarm Log screen showing the alarms.

All alarms display using the same general format:

- **Device X:** The device ordering number shown in the web interface. In the previous example, CMCIII-PU is Device 1 and HPE Adaptive Rack Cooling System is Device 2.
- **(Device Name):** The actual device label that appears in the web interface, such as CMCIII-PU.
- **@N.OX:** N is the CAN Bus number where the alarming device resides. 0X is the component/parameter in the subtree.
- **Subtree component name:** Component under the target device that caused the alarm.
- **(value):** Alarm value pertaining to the component. In the previous example, AC2 Input: Alarm (0) means the AC feed 2 is missing and causing an alarm.

The HPE Adaptive Rack Cooling System web interface shows devices associated with the alarming device.

Name	Value
CMCIII-PU	OK
Modular Cooling System	OK
Device	OK
Modules	OK
Air	OK
Supply	OK
Supply Air 1 (Temp1)	Alarm
DescName	Supply Air 1
Value	--
SetPtHighAlarm	45 °C
SetPtHighWarning	40 °C
SetPtLowWarning	15 °C

Frequently asked questions

HPE Adaptive Rack Cooling System frequently asked questions

Question	Answer
What cooling capacity ranges are available in the HPE Adaptive Rack Cooling System?	The cooling capacity of the heat exchanger unit depends on the water supply temperature and the server inlet set point. The HPE Adaptive Rack Cooling System can cool rack-mounted components consuming up to 150 kW of electrical power.
Is special IT equipment required for use with the HPE Adaptive Rack Cooling System?	No. All IT equipment that uses the front-to-back cooling system can be used without restriction in conjunction with the HPE Adaptive Rack Cooling System.
Does the additional heat from the HPE Adaptive Rack Cooling System increase the room temperature?	The HPE Adaptive Rack Cooling System and IT racks are sealed as much as possible to contain the IT heat load. There could be some heat passed to the room through conduction of the system panels or any gaps in between panels that are not fully sealed.
Can the level of heat removal be regulated in proportion to the waste heat generated?	Yes, the control system automatically adjusts the water flow and air flow to maintain IT inlet temperature set points and supply the proper volume of air required by the system. IT heat is removed to the facility water loop.
How is water connected to the HPE Adaptive Rack Cooling System unit?	Water is connected to the unit using a 2-inch flexible hose with cam and groove fittings. HPE recommends using the HPE ARCS Water Hookup Kit, part number P00675-B21.
Can the HPE Adaptive Rack Cooling System operate with the front or rear door open?	Yes, the HPE Adaptive Rack Cooling System can operate with doors open. However, there might be some air exchange with the room and associated heat load to the room.
<p>⚠ CAUTION: Opening both the front and rear doors at the same time may compromise cooling capacity.</p>	
Does the HPE Adaptive Rack Cooling System require maintenance?	No, assuming that the water quality is maintained, the HPE Adaptive Rack Cooling System is maintenance-free.
Does condensation form?	During normal operation some condensation might form, but the HPE Adaptive Rack Cooling System condensation control system ensures that the condensation does not reach any rack-mounted components. Condensation is collected inside the HPE Adaptive Rack Cooling System unit on the drift eliminator and gathered in the condensation pan for draining to facility drains.

Table Continued

Question	Answer
How does the HPE Adaptive Rack Cooling System unit control humidity?	The HPE Adaptive Rack Cooling System is not set up as a humidity control device. Depending on facility water temperature vs room conditions, the HPE Adaptive Rack Cooling System might remove some humidity from the room through the condensation control system.
How is IT equipment protected from water when using the HPE Adaptive Rack Cooling System?	The HPE Adaptive Rack Cooling System is physically separate from the IT racks. Facility water enters only the HPE Adaptive Rack Cooling System and runs through the cooling coil. Any condensation formed is gathered in the condensate tray at the base of the unit and directed to facility drains through the gravity drain or condensate pump. In the event of greater water flow than what the condensate pan can handle, the HPE Adaptive Rack Cooling System contains overflow switches that shut off the HPE Adaptive Rack Cooling System isolation valves, stopping facility flow and triggering an alarm.
What will happen if water stops flowing to the HPE Adaptive Rack Cooling System?	There is a configurable low flow alarm that can be setup on the HPE Adaptive Rack Cooling System. The system can also be configured with a discharge air temperature alarm. With the automatic door opening kit, the HPE Adaptive Rack Cooling System can also be configured to open IT rack doors when HPE Adaptive Rack Cooling System discharge air temperature exceeds a critical threshold.
Can I install an HPE Adaptive Rack Cooling System to an existing rack in my data center?	No. The HPE Adaptive Rack Cooling System connects to specific racks that support front and rear extensions.
Can I cool more than one rack with one HPE Adaptive Rack Cooling System?	Yes. The HPE Adaptive Rack Cooling System can cool one to four racks, up to two on either side of the HPE Adaptive Rack Cooling System.

Troubleshooting

HPE Adaptive Rack Cooling System troubleshooting

Issue	Resolution
The water flow is low or not flowing.	For more information, see "Temperature Control settings" in the <i>HPE Adaptive Rack Cooling System Web Interface User Guide</i> .
The fan speed is too low.	For more information, see "Cooling performance parameters" in the <i>HPE Adaptive Rack Cooling System Interface User Guide</i> .
The fan speed is too high.	For more information, see "Cooling performance parameters" in the <i>HPE Adaptive Rack Cooling SystemWeb Interface User Guide</i> .
The average server intake temperature (air going to the servers) is too high.	For more information, see "Cooling performance parameters" in the <i>HPE Adaptive Rack Cooling System Web Interface User Guide</i> .
The average server intake temperature (air going to the servers) is too low.	For more information, see "Cooling performance parameters" in the <i>HPE Adaptive Rack Cooling System Web Interface User Guide</i> .
The average exhaust temperature (air coming out of the servers) is too high.	For more information, see "Cooling performance parameters" in the <i>HPE Adaptive Rack Cooling System Web Interface User Guide</i> .
The average exhaust temperature (air coming out of the servers) is too low.	For more information, see "Cooling performance parameters" in the <i>HPE Adaptive Rack Cooling SystemWeb Interface User Guide</i> .
The settings that have been modified through the web interface are not accepted, and the management module LED is flashing red, yellow, or green.	Press and hold the management module C key for five seconds to confirm these settings.
The measurement readings on the management module display or web interface seem to be incorrect, and the management module LED is flashing red, yellow, or green.	Press and hold the management module C key for five seconds to confirm these settings.

Specifications

HPE Adaptive Rack Cooling System specifications

Physical specifications

Item	Specification
Maximum height	200.7 cm (79 in)
Maximum width	60 cm (23.6 in) maximum
Maximum depth (including the rack and rack handle)	166 cm (65.3 in) (Depth includes front and rear extensions)
Maximum shipping height (on skid)	228.5 cm (90.0 in)
Maximum shipping width (on skid)	122.0 cm (48.0 in)
Maximum shipping depth (on skid)	182.9 cm (72.0 in)
Net weight	645 kg (1,423 lb)
Shipping Weight (gross with packaging)	732 kg (1,614 lb)

Electrical specifications

Item	Specification
Input voltage range	380-480V, 3ph Wye (3P+N+Gnd)
Effective cooling	150 Kw at 270 lpm (71 US gal/min)
Rated current maximum	380Y/220V: 17.5A 400Y/230V: 16.7A 415Y/240V: 16.0A 480Y/277V: 13.8A
Steady state current with maximum fans	380Y/220V: 13.0A 400Y/230V: 12.4A 415Y/240V: 11.9A 480Y/277V: 10.3A
Cooling medium	Air and facility water/glycol
Permissible operating pressure max	8 bar (116 psi)

Table Continued

Item	Specification
Maximum operating noise level (with IT rack doors open)	101 dBA
Power cords	IEC 60309 32/30A 220/415V 6h/IP44 (Quantity 2) Maximum branch circuit size: 32A NEMA L22-20P 277/480V 4P/5W (Quantity 2) Maximum branch circuit size: 20A

Thermal and air flow performance

Thermal and air flow performance parameters	Single rack
Air temperature—Inlet to rack-mounted components	User adjustable up to 40°C (104°F)
Chilled water temperature	7°-32°C (45°-89.6°F)
Total rack-mounted component air flow	With 4 fans: up to 10,000 CFM (16,990 m ³ /h) With 3 or 4 fans: 7,500 CFM (12,743 m ³ /h) Operating 150 kW maximum Performance is dependent on water temperature and air temperature set point.
Chilled water flow rate	270 l/min (71.3 US gal/min)
Chilled water pressure differential at flow necessary to meet thermal specifications	15 psid
Server heat load	150 kW maximum For more information, see "Determining heat load capacities" in the <i>HPE Adaptive Rack Cooling System Site Preparation Guide</i> .

Environmental specifications

Parameter	Value
Room temperature:	
Recommended minimum/maximum	10°C (50°F)/50°C (122°F)
Humidity:	
Recommended range	8% to 90% relative humidity, non-condensing
Air quality	Standard Hewlett Packard Enterprise requirements

The temperatures stated are for an elevation of -76.2 m (-250 ft) to 3,048 m (10,000 ft) above sea level.

Rack specifications

HPE ARCS 42U 600x1600mm Rack

U Height	Width	Depth	Weight (Empty)
42U	600 mm (23.6 in)	1,600 mm (with extensions) (63.0 in)	158.76 kg (350 lb)

HPE ARCS 48U 600x1600mm Rack

U Height	Width	Depth	Weight
48U	600 mm (23.6 in)	1,600 mm (with extensions) (63.0 in)	181.44 kg (400 lb)

Replaceable parts and maintenance and service information

Obtaining replaceable parts

For more information on replaceable parts, see the *HPE Adaptive Rack Cooling System Maintenance and Service Guide*.

Procedure

1. Go to the [HPE website](#).
2. From the top of the screen, select **Support**.
3. Select **HPE Support Center**.
4. In the product field, enter **HPE Adaptive Rack Cooling System**, and click **Enter**.
5. From the Resources section, select **Manuals**.
6. From the Quick jump to manuals section, select **Service and maintenance information**.

Maintenance and service

For information on maintenance and service, see the Hewlett Packard Enterprise website (<http://www.hpe.com>).

Air and water heat exchanger maintenance

The air and water heat exchanger requires no maintenance. If particulates are present in the cooling water, a filter must be fitted immediately upstream from the water inlet fittings. Check the functionality of the condensation drainage system regularly. Regularly perform visual inspections for leaks (annually).

Water quality and leveling requirements and condensation management

Acceptable water quality specifications

The HPE Adaptive Rack Cooling System requires facility water to meet the conditions listed in the following table for continuous quality of performance. Hewlett Packard Enterprise recommends using a #30 mesh filter for water supplied to the HPE Adaptive Rack Cooling System.

The following values are water quality ranges required for continuous quality of performance.

Parameter	Range
pH	7-9
Specific conductance at 25°C (77°F)	<2500 µmhos
Sulfur (SO ₄), total	<100 ppm
Chloride (Cl)	<50 ppm
Sulfide (S)	<10 ppm
Hardness (CaCO ₃), total	<200 ppm
Iron (Fe), total	<3.0 ppm
Manganese (Mn), total	<0.1 ppm
Bacteria	<1000 CFUs/ml
Residue on evaporation	<500 ppm
Turbidity	20
Corrosion inhibitor	Recommended

 **CAUTION:** Water that is out of spec might cause decreased cooling capacity or disruption in service. The water flowing into the HPE Adaptive Rack Cooling System must meet the guidelines stated in this guide. Damage caused by contaminated water is not covered by the HPE Adaptive Rack Cooling System warranty.

If your water is out of range, consult a water quality expert.

Hewlett Packard Enterprise recommends using particulate filtration on the dedicated water supply system connected to the HPE Adaptive Rack Cooling System.

Frost damage

To avoid frost damage, the water temperature must not fall below the minimum permissible temperature of +0 °C (+32°F) at any point in the water cycle.

Before storage or transportation at subzero temperatures, the water cycle must be drained completely using compressed air. Avoid setting the target temperature lower than necessary because the danger of falling below the dew point increases as water temperature decreases. Ensure that the racks are sealed on all sides, especially at the cable inlet to prevent condensation formation.

Water precautions

Take the following precautions during the installation of the HPE Adaptive Rack Cooling System:

- Before installing the HPE Adaptive Rack Cooling System Hook-Up Kit, ensure that all foreign matter and particulates are flushed from the system.
- Evaluate the short-term and long-term system requirements against the available water capacity.
- Ensure that the chilled water loop is properly designed for liquid cooling systems and is separate from the sanitary water systems, such as sink and drinking water, in your building.
- Ensure that facility managers understand the additional load being added to the chilled water supply of the building. The added heat load might affect other components cooled by the chilled water plant.

Plumbing materials to avoid

Hewlett Packard Enterprise recommends avoiding the following materials in a closed water system.

- Oxidizing biocides
- Aluminum components
- Brass components with high levels of zinc

Leveling requirements

Use the leveling feet to adjust the height of the individual racks to match neighboring racks. Use the leveling pads for weight distribution. Be sure that the weight is distributed evenly and the rack holes align.

Condensation management

The HPE Adaptive Rack Cooling System and CDU rack drain pans collect any condensation that forms.

When the specified condensation level in the condensation tray is reached, a sensor activates a pump that pumps the condensation from the drain pan. A further discharge tube runs out of the system from condensation tray to drain any excess fluid. Connect these hoses to a collection system or an external drain.

To ensure reliable drainage:

- Ensure no kinks form in the drainage hose.
- Do not reduce diameter of drainage hose.
- Route the drainage hoses so that they always run downhill.

To avoid excessive buildup of condensate and to conserve energy, consider raising the cooling water temperature to the necessary cooling capacity.

Websites

General websites

Hewlett Packard Enterprise Information Library

www.hpe.com/info/EIL

Single Point of Connectivity Knowledge (SPOCK) Storage compatibility matrix

www.hpe.com/storage/spock

Storage white papers and analyst reports

www.hpe.com/storage/whitepapers

For additional websites, see [Support and other resources](#).

Support and other resources

Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website:
<http://www.hpe.com/assistance>
- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website:
<http://www.hpe.com/support/hpesc>

Information to collect

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.
- To download product updates:

Hewlett Packard Enterprise Support Center

www.hpe.com/support/hpesc

Hewlett Packard Enterprise Support Center: Software downloads

www.hpe.com/support/downloads

Software Depot

www.hpe.com/support/softwaredepot

- To subscribe to eNewsletters and alerts:

www.hpe.com/support/e-updates

- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center **More Information on Access to Support Materials** page:

www.hpe.com/support/AccessToSupportMaterials

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- !** **IMPORTANT:** Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HPE Passport set up with relevant entitlements.
-

Customer self repair

Hewlett Packard Enterprise customer self repair (CSR) programs allow you to repair your product. If a CSR part needs to be replaced, it will be shipped directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your Hewlett Packard Enterprise authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or go to the CSR website:

<http://www.hpe.com/support/selfrepair>

Remote support

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which will initiate a fast and accurate resolution based on your product's service level. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

If your product includes additional remote support details, use search to locate that information.

Remote support and Proactive Care information

HPE Get Connected

www.hpe.com/services/getconnected

HPE Proactive Care services

www.hpe.com/services/proactivecare

HPE Proactive Care service: Supported products list

www.hpe.com/services/proactivecaresupportedproducts

HPE Proactive Care advanced service: Supported products list

www.hpe.com/services/proactivecareadvancedsupportedproducts

Proactive Care customer information

Proactive Care central

www.hpe.com/services/proactivecarecentral

Proactive Care service activation

www.hpe.com/services/proactivecarecentralgetstarted

Warranty information

To view the warranty for your product, see the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products* document, available at the Hewlett Packard Enterprise Support Center:

www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional warranty information

HPE ProLiant and x86 Servers and Options

www.hpe.com/support/ProLiantServers-Warranties

HPE Enterprise Servers

www.hpe.com/support/EnterpriseServers-Warranties

HPE Storage Products

www.hpe.com/support/Storage-Warranties

HPE Networking Products

www.hpe.com/support/Networking-Warranties

Regulatory information

To view the regulatory information for your product, view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the Hewlett Packard Enterprise Support Center:

www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional regulatory information

Hewlett Packard Enterprise is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (Regulation EC No 1907/2006 of the European Parliament and the Council). A chemical information report for this product can be found at:

www.hpe.com/info/reach

For Hewlett Packard Enterprise product environmental and safety information and compliance data, including RoHS and REACH, see:

www.hpe.com/info/ecodata

For Hewlett Packard Enterprise environmental information, including company programs, product recycling, and energy efficiency, see:

www.hpe.com/info/environment

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