

HP Performance-Optimized Datacenter User Guide



Part Number 573766-001
April 2009 (First Edition)

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Intended audience

This document is for the person who installs, administers, and maintains HP Performance-Optimized Datacenters and their supporting infrastructures. You should be qualified in the design, construction, or maintenance of power, cooling, and IT infrastructures and be trained in recognizing products with hazardous energy levels.

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Site requirements

Optimum environment

Specific environmental requirements must be met to provide optimum performance with minimum maintenance for your unit.

HP provides the *HP Performance-Optimized Datacenter Site Requirements Information* document to learn about these requirements and plan your configuration more efficiently. The latest version of the guide is available on the HP website (<http://www.hp.com/go/pod>).

Location considerations

The HP POD can be located either inside or outside your facility.

If the HP POD is not sitting on a trailer, it must be installed on a flat, level surface capable of supporting up to 50,348 kg (111,000 lb).

Consider the proximity to existing facility utilities (power and water) when choosing the final location.

A site map with the final location of the HP POD, final location of the transformer and switchboard, final location of the tempered water package, facility connection points, and any obstructions must be provided to HP prior to scheduling your delivery and installation.

For more specific power, water, and electrical considerations, see the *HP Performance-Optimized Datacenter Site Requirements Information* document on the HP website (<http://www.hp.com/go/pod>).

Exterior dimensions and weight

The HP POD is approximately 12.2 m (40 ft) long, 2.4 m (8 ft) wide, and 2.0 m (9.5 ft) tall.

The HP POD weighs approximately 11,340 kg (25,000 lb) when it is empty and can weigh up to 50,348 kg (111,000 lb) when fully loaded with IT equipment and options.

Before the arrival of your HP POD, verify that the location you have chosen can adequately support the size and weight of the HP POD.

Moving the HP POD



IMPORTANT: If you move the HP POD on your own, it will void your warranty.

If you choose to move the HP POD to a new location, contact HP before attempting to move the HP POD. HP can provide detailed instructions and/or services for shutting down and moving the HP POD.

System utilities

NOTE: Two independent power sources are required for the redundant power functionality.

Your site location must accommodate the following utilities:

- Chilled water
- Power
- Drain (optional)

Available to connect to central facility infrastructure

- BMS using BacNet protocol
- Auxiliary single-phase branch power (20A-outlet)
- Site networking connection
- Fire alarm connection
- Telephone system (optional)
- Security system (optional)
- Domestic water for humidifier (optional)

Transformer, switchboard, and tempered water package locations

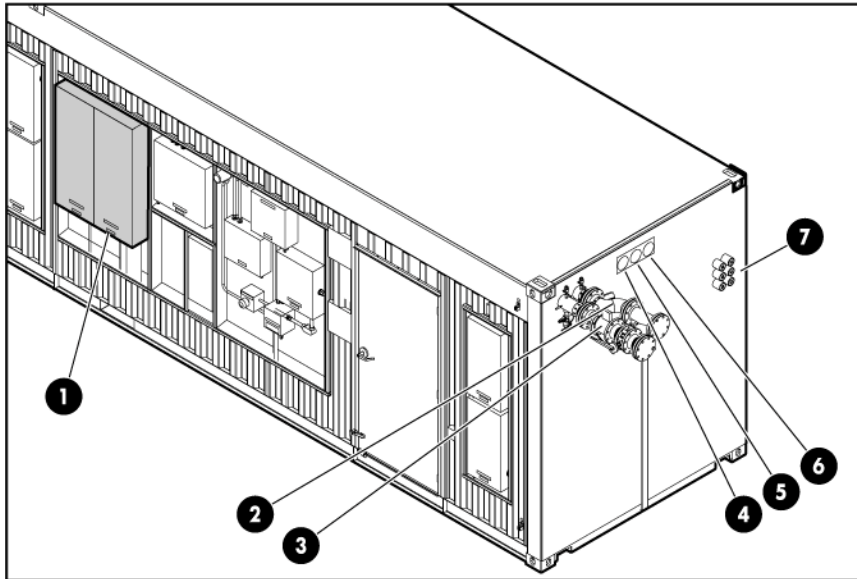
If you choose to purchase the optional components, consider:

- Distance from the facility utilities
- Distance from the HP POD

The transformer and switchboard can be installed within 3 m (10 ft) of the HP POD during normal installation. The transformer and switchboard can be installed over 3 m (10 ft) from the HP POD, but this requires additional planning and costs. Electrical regulations require that the transformer and switchboard are installed no greater than 15.5 m (50 ft) and in direct line for site from the HP POD.

The tempered water package can be installed within 3 m (10 ft) of the HP POD during normal installation. The tempered water package can be installed over 3 m (10 ft) from the HP POD, but this requires additional planning and costs. HP recommends installing the tempered water package no more than 30 m (98 ft) from the HP POD.

HP POD connection locations



Callout	Connection
1	Main input power junction boxes
2	Chilled water supply connection
3	Chilled water return connection
4	Fire connection
5	Security connection
6	Telephone connection
7	IT cable portals*

*There are identical IT cable portals on the left side of the HP POD.

Work space requirements



IMPORTANT: Failure to comply with the work space requirements can result in failed authorization to power your HP POD by local electrical inspectors and you local AHJ.

Work space lighting

Make sure that the HP POD, transformer, switchboard, and tempered water package are installed in a well lit area that complies with local work space lighting requirements, per code regulations.

Work platform requirements

NOTE: The base of the work platform should be level with the base of the HP POD. If you choose to leave the HP POD on a trailer, a work platform is required.

The area outside of the HP POD directly in front of the panels must have a work platform. The specifications of the work platform are:

- The work platform must be a minimum of 1 m (3 ft) wide for standard platforms, and 1.1 m (3.5 ft) wide if the work platform is constructed of grounded metal.
- The work platform surface must be <2.0 m (6.6 ft) from the center of any circuit breaker actuator handle.

Environmental considerations

HP recommends considering the following suggestions for your facility. Some considerations might not apply, particularly if you keep your HP POD inside another building at your facility.

- Install lightning protection for the HP POD.
- Make sure that the HP POD is properly grounded.
- Avoid placing the HP POD directly along a drainage path or in an area prone to flooding.
- Raise the HP POD slightly off the ground, or set it on a higher point of elevation. In low elevated areas, HP recommends setting the HP POD on a concrete housekeeping pad.
- Avoid placing the HP POD directly in the path of external heat loads such as a diesel generator or an air cooled chiller.
- Install a properly engineered awning to enable access to the HP POD in adverse weather conditions.

Temperature considerations

Operating temperature

The standard operating temperature range for the HP POD is from -28.9°C to 54.4°C (-20°F to 130°F).

You might choose to purchase the additional insulating paint ("[Additional insulation](#)" on page 49), which can potentially lower your operating temperature.

In locations prone to freezing, HP recommends running at least 100 kW of IT equipment to prevent equipment and chilled water lines from freezing.

Water temperature

Without a tempered water package, the temperature of the water supplied to the HP POD must be 13°C to 24°C (55°F to 75°F). Freezing water might cause a blockage and damage to the unit.

The minimum server inlet temperature is 10°C (50°F).

Leveling requirements

The site location for the HP POD must be level +/- 0.5 degree tolerance.

Grounding requirements



IMPORTANT: Before installing the HP POD, consult your local AHJ for applicable codes and to review site-specific location guidelines.

The HP POD must be grounded in accordance to local electric code. HP recommends grounding the HP POD, the transformer and switchboard, and the tempered water package to your grounding system for full protection.

Lightning protection

If the HP POD is installed in an outdoor environment, HP recommends hiring a lightning protection consultant to evaluate potential lightning risks and assess possible HP POD lightning protection schemes.

Component documentation

The *Operations and Maintenance Manual*, that includes all contractor-installed component documentation and all server and IT equipment documentation is delivered with your HP POD.

Safety considerations

Safety information

The HP POD has been listed to the UL 69050 as an Information Technology Product and Classified according to the National Electric Code, NFPA-70, 2008.

The HP POD is not suitable for long term personnel occupancy.

The HP POD provides service access areas for periodic maintenance and service, only to be used by owner authorized personnel specifically trained in the maintenance and service of the HP POD IT components.

The safety information is specific to the people operating and maintaining the components of the HP POD.



IMPORTANT: All plumbing to and from the HP POD must be completed by a licensed plumber.



IMPORTANT: All wiring in and around the HP POD must be completed by a licensed electrician.

Operator safety



WARNING: To avoid risk of personal injury, hearing protection must be worn at all times when working inside the HP POD.



WARNING: To avoid risk of personal injury, use caution where slip hazards are present. Any water that drains around the HP POD causes a potential slip hazard.



WARNING: To avoid risk of personal injury or damage to the equipment, do not insert anything inside the electrical busways except the approved HP busway dropboxes.

Component health



CAUTION: If the chilled water stops flowing into the HP POD:

- Turn off all IT equipment
 - Open the HP POD doors, if weather permits
 - View the BMS alarm ("[BMS alarms](#)" on page 47) conditions
-



CAUTION: During operation of the HP POD, the overhead fan doors must remain closed.



CAUTION: All customer supplied water fittings must be composed of carbon steel, stainless steel, or copper. Do not use cast iron, aluminum, or PVC fittings.

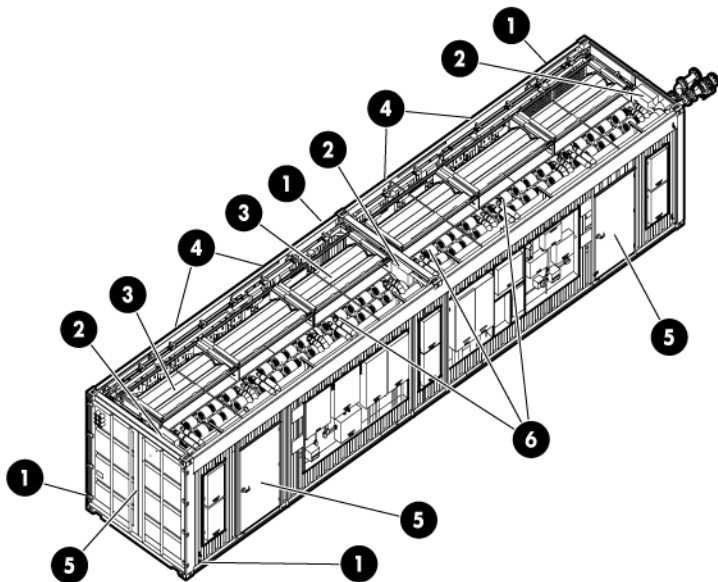


CAUTION: During operation, avoid leaving the HP POD doors open, to maintain accurate environmental conditions inside the HP POD.

Component identification

HP POD components

HP POD components

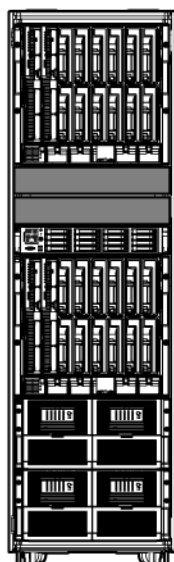


Item	Component	Description
1	Drain lines	Collect water from the drain pans and removes it from the HP POD
2	Electrical busway end feeds	Main source of distributing power throughout the HP POD
3	Heat exchangers	Use chilled water to cool the air
4	Rear service doors	Enable access to the rear of the rack-mounted components
5	Entrance doors	Enable access to the front of the rack-mounted components
6	Fan units	Circulate the cool air throughout the HP POD

Rack components

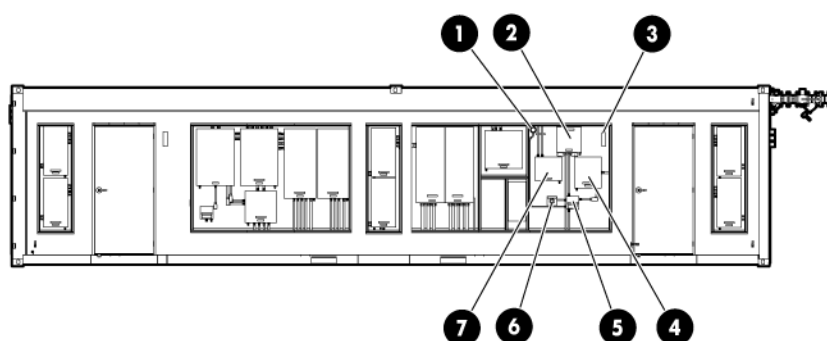
There are 22 configured racks inside the HP POD. The following diagram is an example of a fully-loaded and configured rack. Your rack might include different servers and components.

If any of the racks within the HP POD contain empty U space, you must use the HP POD Filler Panel (AQ682A, AS993A) to avoid compromising the integrity of the hot and cold aisle temperatures.



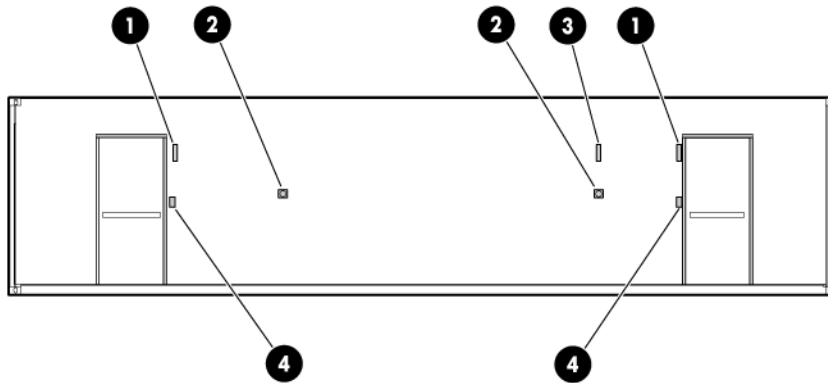
HP POD emergency components

External emergency components



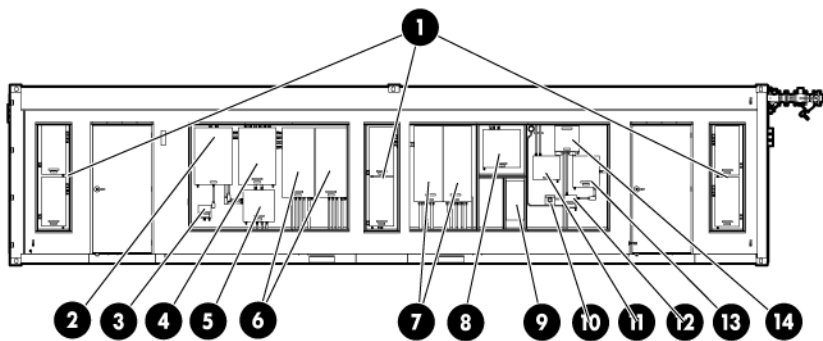
Item	Component	Description
1	Fire strobe and horn	Indication of a fire alarm condition within the HP POD.
2	EPO panel	Contains controls and status indicators for the EPO system.
3	EPO alarm lamp (red)	Activated when an EPO alarm button is pressed.
4	Fire alarm control panel	Contains controls and status indicators for the fire alarm system.
5	Fire alarm XFMR	Fire alarm transformer
6	EPO button	Pressing this button cuts off all power to the HP POD and activates the EPO alarm lamp.
7	ASSD panel	Samples the air in the HP POD, monitoring smoke

Internal emergency components



Item	Component	Description
1	Internal fire strobe and horn (x2)	Indication of a fire alarm condition within the HP POD.
2	EPO button (x2)	Pressing one of these buttons cuts off all power to the HP POD and activates the EPO strobe.
3	EPO strobe	Activated when an EPO button is pressed.
4	Fire alarm manual pull station (x2)	Pulling one of these switches activates the fire strobes and horns.

HP POD panel locations



Item	Component	Description
1	Electrical busway enclosed circuit breaker (on page 40)	<p>225A electrical panel board that power the electrical busways:</p> <ul style="list-style-type: none"> Four electrical busway panels are installed in the standard HP POD. Six electrical busway panels are installed in the high density HP POD.
2	BMS panel (on page 39)	Building Management System

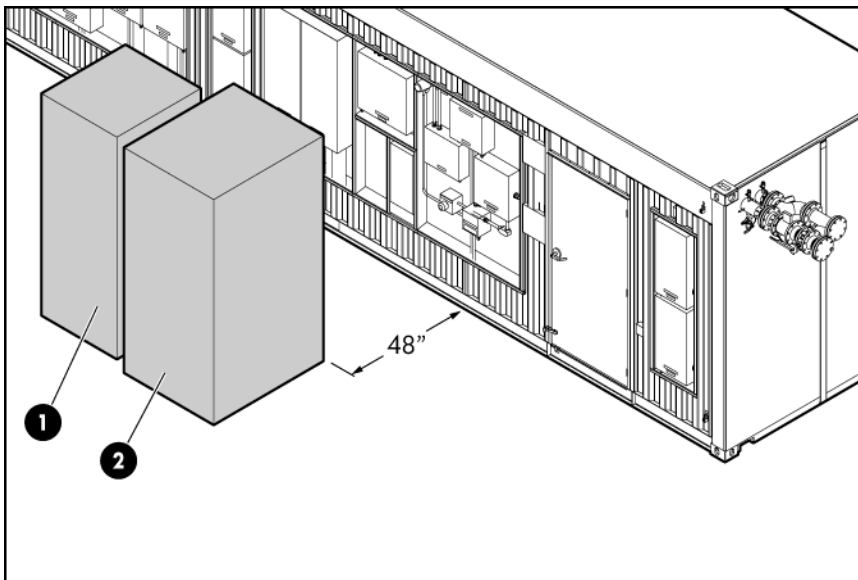
Item	Component	Description
3	Auxiliary single-phase branch circuit power*	Provides auxiliary power for the BMS or convenience outlets. 100-120V, 60 Hz or 220-240V, 50 Hz owner-provided power.
4	Fan control (FC) panel (" Fan control panel " on page 42)	Fan speed control panel
5	House relay transfer panel (on page 42)	Automatically transfers house loads from House panel A to House panel B when primary power is lost
6	House panels A and B (" House panels " on page 42)	125A electrical panel boards that provides all HP POD electrical requirements, except for the IT equipment
7	Junction boxes	Main power input boxes for incoming electrical feeder cables
8	Security panel (" Security panel location " on page 42)	Reserved for installing interface and power requirements for any optional security devices installed.
9	Humidifier (on page 49)*	Maintains the humidity inside the HP POD within a set range
10	EPO button	Emergency power off actuator that cuts off all power to the POD and activates the EPO alarm lamp.
11	ASSD panel (on page 39)	Air sampling smoke detection system
12	Fire alarm XFMR	Powers 120V Fire Alarm system components, if required
13	Fire alarm control panel (on page 42)	Contains controls and status indicators for the fire alarm system
14	EPO panel (on page 40)	Contains controls and status indicators for the EPO system

*Optional component ("[Optional components](#)" on page 49)

Transformer and switchboard components (optional)

Though one transformer and one switchboard are shown, two transformers and two switchboards are required for the redundant power functionality.

NOTE: The transformer and switchboard must be a minimum of 1.2 m (48 in) away from the HP POD.

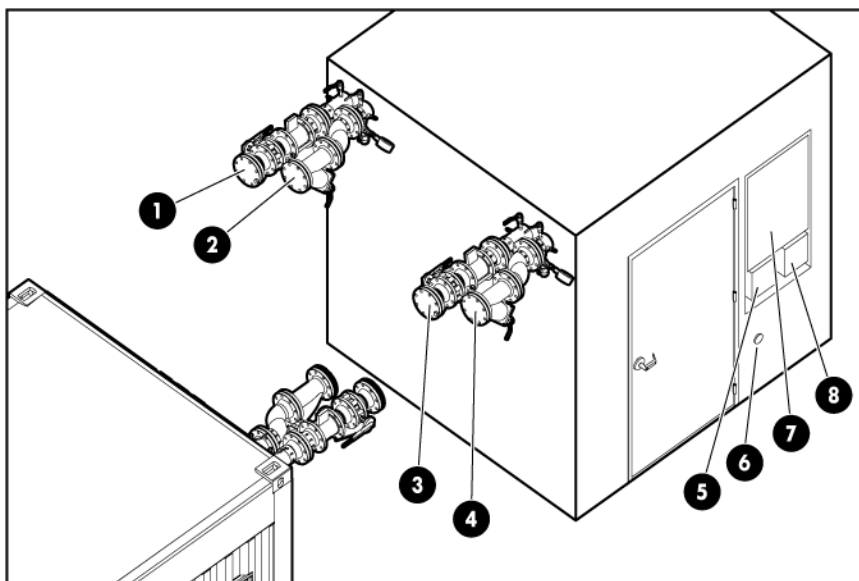


Item	Component	Description
1	Switchboard	Distributes power to each of the electrical busways breakers and the House panel
2	Transformer	Transforms power from 480V at your facility to the 415V needed for the HP POD

Tempered water package components (optional)

NOTE: You must supply water and fill the water fill tank. HP can fill your water tank, but it requires additional planning and costs.

The tempered water package is an optional component that is composed of two closed-loop systems: one for the facility water and one for the HP POD water. The water for the HP POD is to be supplied through the fill tank and chemically treated prior to entering the HP POD to ensure adequate water quality ("Water quality requirements" on page 32).



Item	Component	Description
1	Facility supply connection	Connection to the facility supply line
2	Facility return connection	Connection to the facility return line
3	HP POD supply line	Connection to the HP POD supply line
4	HP POD return line	Connection to the HP POD return line
5	Panel disconnect	Power disconnect for tempered water package components
6	Fill tank connection	Connection to supply water to the tempered water package fill tank
7	400A panel board	400A electrical panel board providing auxiliary electrical requirements

Item	Component	Description
8	Panel disconnect	Power disconnect for tempered water package components

Installation

HP POD contents

The following items are shipped with the HP POD, and are delivered at the time of your HP POD delivery and installation.

Standard density 40-ft HP POD

Component	Quantity	Part number
Either of the following: <ul style="list-style-type: none">HP Tempered water package ("Tempered water package components (optional)" on page 17)Engineer your own site water for a minimum of 240 gal/min, 12° to 24°C (55° to 75°F)	1	AH988A
HP 50U rack	22	AN982A
Side panel 50U kit	1	AN991A
50U rack bracket kit	21	AP014A
Either of the following busway dropbox and PDU kits: <ul style="list-style-type: none">Three phase HP POD busway dropbox kit	11 (non-redundant) 22 (redundant)	AS613A
<ul style="list-style-type: none">Three phase HP POD PDU bracket kit	44	AQ683A
Rack interface seal kit	21	AP013A

High density 40-ft HP POD

Component	Quantity	Part number
Either of the following: <ul style="list-style-type: none">HP Tempered water package ("Tempered water package components (optional)" on page 17)Engineer your own site water for a minimum of 240 gal/min	1	AH988A
HP 50U rack	22	AN982A
Side panel 50U kit	1	AN991A
50U rack bracket kit	21	AP014A
Either of the following busway dropbox and PDU kits: <ul style="list-style-type: none">Three phase HP POD busway dropbox kit	22	AS613A
<ul style="list-style-type: none">Three phase HP POD PDU bracket kit	44	AQ683A
Rack interface seal kit	21	AP013A

NOTE: To provide power to your HP POD, you can either:

- Purchase an HP Transformer and HP Switchboard ("[Transformer and switchboard components \(optional\)](#)" on page 16) and engineer your site power to support their requirements
 - Non-redundant power—one of each
 - Redundant power—two of each
 - Engineer your own site power
 - Standard HP POD—1200A minimum
 - High density HP POD—1600A minimum
-

The HP POD is delivered with heavy duty filler panels installed in every empty U space of the racks. However, HP recommends purchasing additional HP POD Filler Panels (AQ682A, AS993A) to prevent compromising the integrity of the cold aisle set point temperature when IT equipment is removed for upgrades or maintenance.

The quantity and model of PDUs included with your HP POD are dependent on the IT equipment load they are supporting.

Preinstallation checklist



CAUTION: Tighten the electrical busway connections after the HP POD is in its final location and before you begin the installation process.

Before you begin the installation of your HP POD, verify the following action items have been completed:

- All components are delivered to your facility.
- The HP POD, transformer, switchboard, and tempered water package are in their final locations.
- You must have facility power at your final location. You can provide the connection cables from the facility to the transformer and switchboard or purchase connection cables from HP at additional costs.
- You must have facility water at your final location. You can provide the connection hoses from the facility to the tempered water package or purchase connection hoses from HP at additional costs.
- The HP POD has been properly grounded ("[Grounding requirements](#)" on page 9).

Required tools

- 10-ft ladder (2)
- 6-ft ladder (2)
- Tongue-and-groove pliers with 4.25-in capacity jaws
- Screwdriver set
- Ratchet set
- Diagonal cutters
- Heavy-duty tie wraps
- Pipe wrench

Installing the HP POD using the optional components

The following steps are an overview of the installation procedure for installing a HP POD, using the transformer, switchboard, and the tempered water package.

You must obtain service professionals to connect your power and water.



IMPORTANT: All wiring in and around the HP POD must be completed by a licensed electrician.



IMPORTANT: All plumbing to and from the HP POD must be completed by a licensed plumber.

Connecting the water

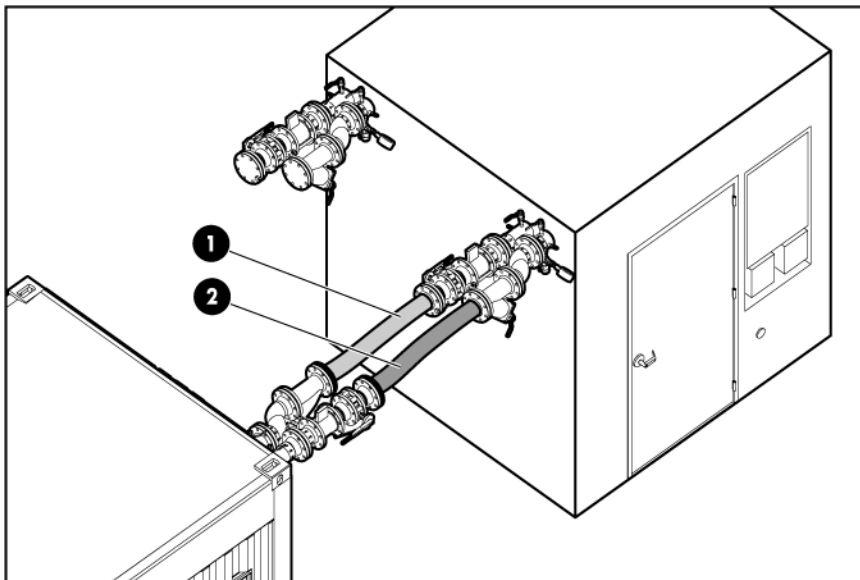


CAUTION: All customer supplied water fittings must be composed of carbon steel, stainless steel, or copper. Do not use cast iron, aluminum, or PVC fittings.

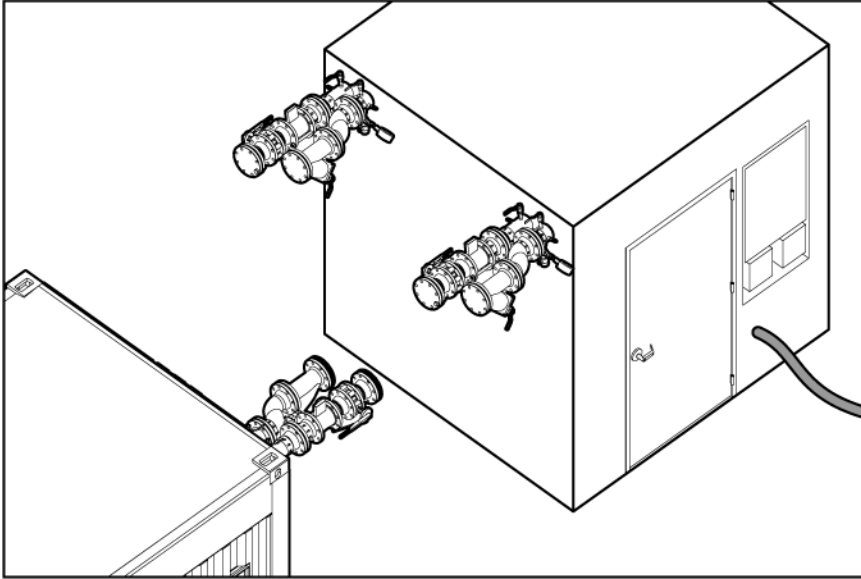
1. Before you connect your facility water to the tempered water package, flush the cooling water pipes.
 - a. Connect water directly to the HP POD.
 - b. Allow the water to run until it is clean, flushing any contaminants that might have entered the cooling pipes during shipping or delivery.

NOTE: For easy reference, the water piping is labeled with green tape and white arrows pointing in the direction of the water flow.

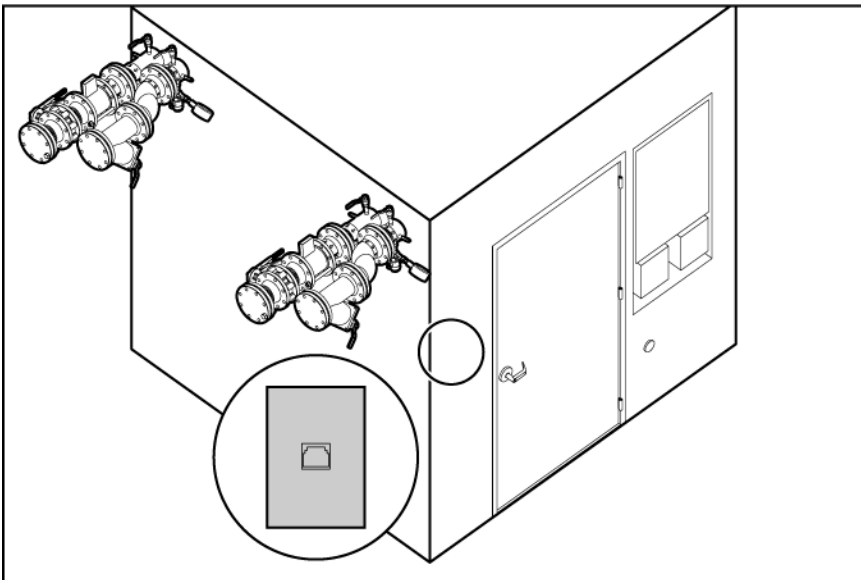
2. Connect the 4-in return and supply lines from the tempered water package to the HP POD.



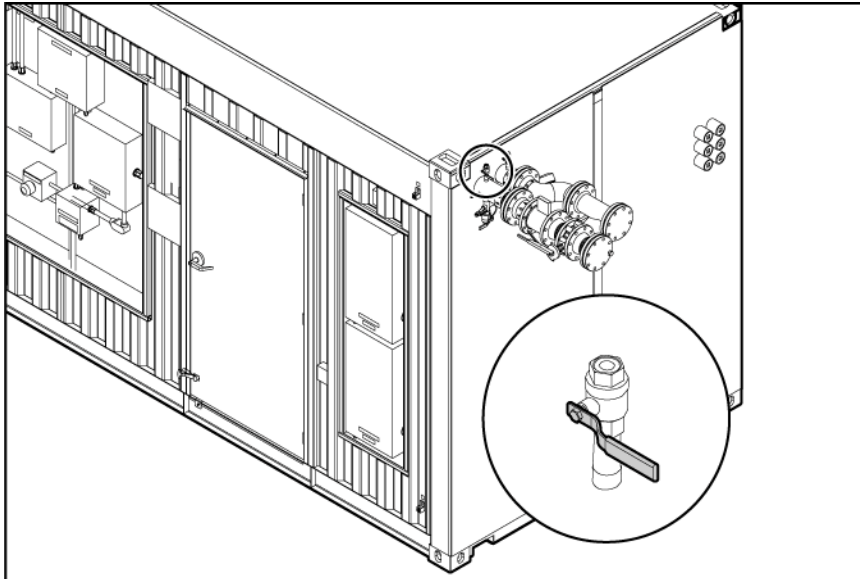
3. Pump domestic or industrial water into the tempered water package closed-loop system fill tank, according to the water quality requirements (on page 32).



4. Initiate the system pumps on the tempered water package:
- Manually initiate the system pumps with the main power switch located on the pumps.
 - or -
 - Connect the tempered water package to the BMS system, and initiate the system pumps through the BMS.



5. Open the bleeder valve on the HP POD return line.



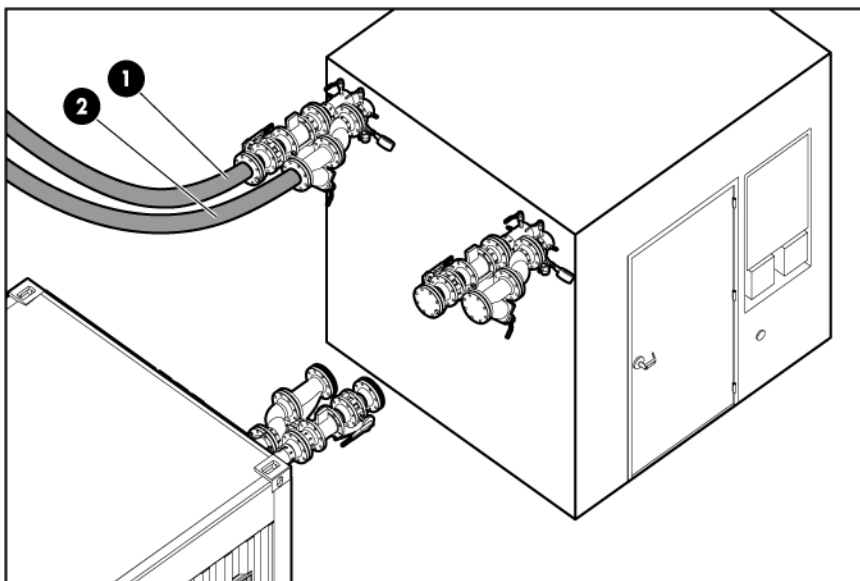
6. When the tank is full and there is no more air coming out of the bleeder valve, close the bleeder valve on the HP POD return line.

NOTE: The HP POD pipe design is rated for a maximum pressure rating of 150 psi.

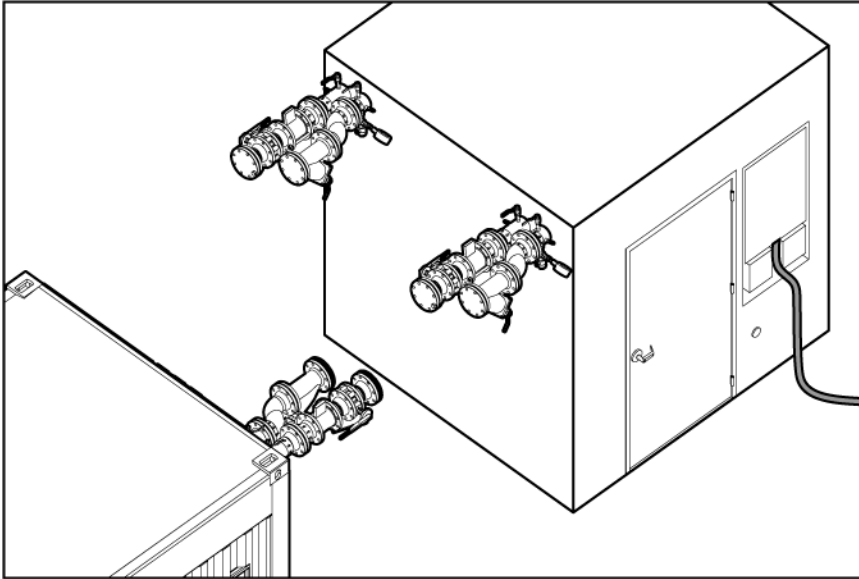
7. Verify that your facility water pressure differential (between supply and return) is within the acceptable range (16 psi minimum).

NOTE: For easy reference, the water piping is labeled with green tape and white arrows pointing in the direction of the water flow.

8. Connect the facility supply and return lines to the tempered water package.

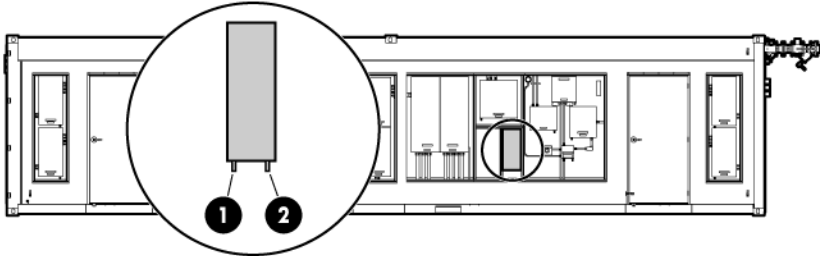


9. Connect the tempered water package to your facility power source.



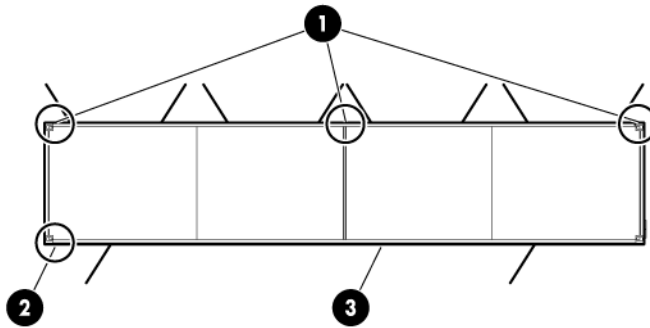
IMPORTANT: Provide freeze protection to the humidifier water supply.

10. (Optional) Connect the HP POD humidifier to the domestic or industrial water drain (1) and supply (2) lines. For more information about the humidifier, see the product documentation.



11. Perform one of the following in accordance with local codes:
- If your HP POD is located inside, HP recommends connecting each of the drains to the local drain line.

- If your HP POD is located outside, you can choose to connect to the local drain line, or allow the water to drain off freely in your location. For more information, see Drain locations ("[HP POD drains](#)" on page [31](#)).



Connecting the power



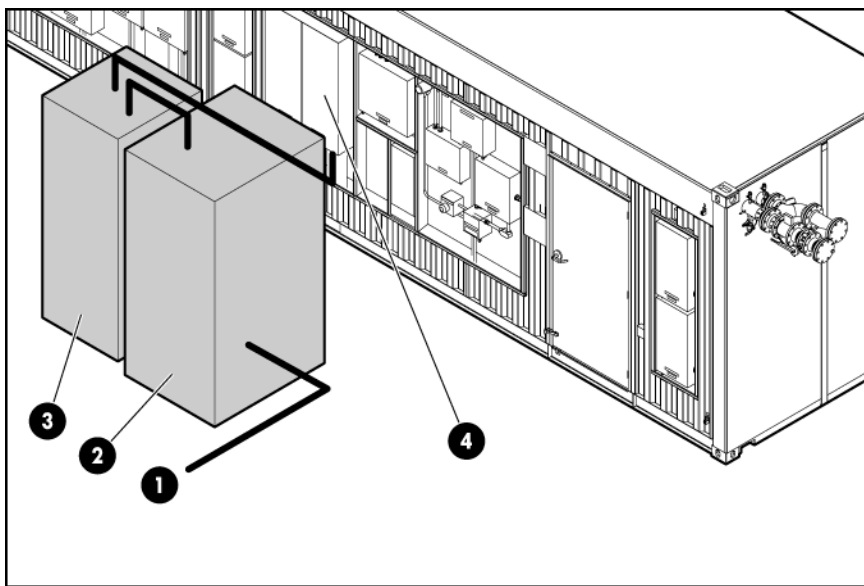
IMPORTANT: A licensed electrician must connect the power according to the local electric code, consistent with supplier and consulting engineer drawings.

1. Verify that the HP POD, transformer, and switchboard are in their final locations.

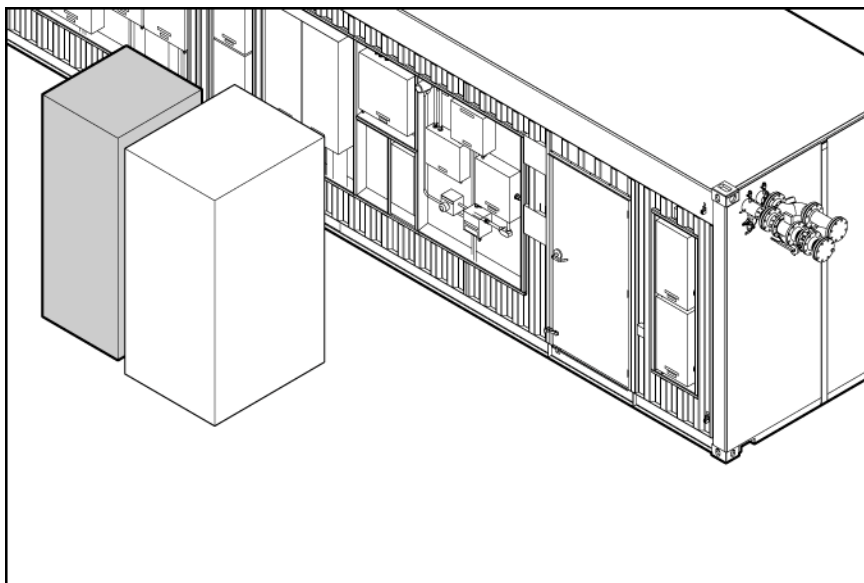
NOTE: The following steps detail the connection procedure for a non-redundant power installation. If you are installing your HP POD for redundant power, you will have connections to two transformers and two switchboards.

2. Make all connections:
 - a. Connect the main power leads from your facility to the transformer (1 to 2).
Each connection is labeled with colored tape, according to local standard requirements.
 - b. Connect the transformer to the switchboard (2 to 3).
 - c. Connect the three 3-in flexible conduits from the switchboard to the junction box on the HP POD (3 to 4).

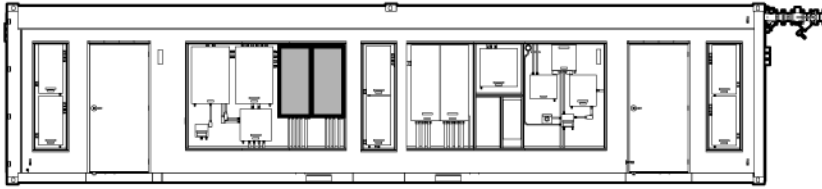
Each connection is labeled. Two of the conduits power the electrical busway breakers and one powers the house panel.



3. Turn on facility power.
4. Close the required breakers on the switchboard.



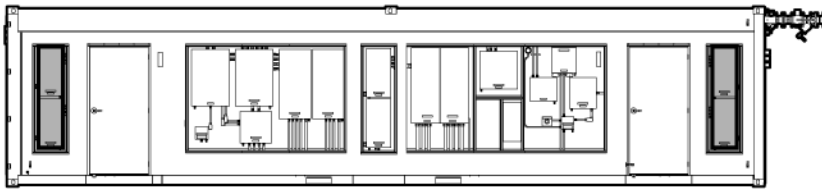
5. Close the main breaker in both of the House panels on the exterior of the HP POD.



6. Close the remaining breakers in the House panel one by one, following the panel schedule on the inside of the House panel.

NOTE: If you are installing a high density HP POD, you must also close the main breaker in the electrical busway 3 panel.

7. Close the main breakers in the electrical busway panels.



8. Inside the HP POD, close the breaker on each drop box that is connected to a rack of IT components.
9. Power up your remaining racks and IT components following your standard IT startup procedure.

Commissioning the HP POD


Commissioning your HP POD is an optional service and is customized based on your facility. A typical commissioning process includes the following tests:

- Tighten the electrical busway connections.
- Verify accurate electrical installation.
- Verify accurate mechanical installation.
- Test the operation of the BMS and Cooling controls.
- Test the operation of the smoke detection system.
- Test the operation of EPO system.

- Test the operation of the analog and digital phone system (optional).
- Verify initial IT start-up.
- Conduct an infrared scan of all electrical connections under the start-up IT load.
- Verify accurate cooling under start-up IT load.
- Provide the HP POD operation owner training.

Cooling system

HP POD cooling system

 **CAUTION:** Contaminated supply water might cause decreased cooling capacity or disruption in service. The supply water must meet the guidelines states in the HP Performance-Optimized Datacenter Site Requirements Information document. Damage caused by contaminated supply water is not covered by the warranty.

The HP POD has 12 heat exchangers that maintain temperature and cool the equipment installed in the HP POD. The HP POD heat exchangers receive chilled water from either the tempered water package or your facility, cycles the water through the heat exchangers to cool the air, and then the fan units circulate the cool air throughout the HP POD.

Fan speeds are controlled based on two setpoints, programmed into the BMS.

- Hot aisle temperature setpoint
- Differential pressure setpoint between the hot and cold aisles

The fan units regulate speeds to maintain both parameters. For more information, see [Controlling the fan speed](#) (on page 29).

Depending on the IT equipment you have installed in your HP POD, you might choose to change both of these factory set parameters to improve the overall efficiency of your system. To discuss the effects of changing these parameters for your specific HP POD, contact HP ("[HP contact information](#)" on page 60).

Water supply temperature

If you are using a tempered water package, water is supplied to the HP POD between 13°C and 24°C (55°F and 75°F). HP recommends that you supply water to the tempered water package between 4°C and 24°C (40°F and 75°F).

If you are not using a tempered water package, HP recommends supplying water to the HP POD between 13°C and 24°C (55°F and 75°F).

Controlling the fan speed

The HP POD fans operate at variable speeds to maintain two setpoints, programmed into the BMS:

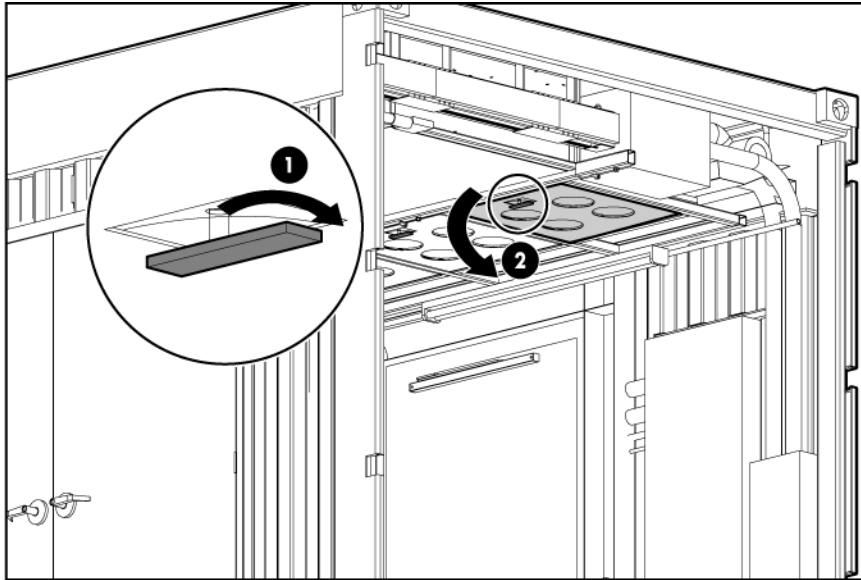
- Hot aisle temperature setpoint
- Differential pressure setpoint between the hot and cold aisles

The fan speed adjusts to maintain both setpoints. You cannot manually adjust the fan speed.

Depending on the IT equipment you have installed in your HP POD, you might choose to change both of these factory set parameters to improve the overall efficiency of your system. To discuss the effects of changing these parameters for your specific HP POD, contact HP ("[HP contact information](#)" on page 60).

To access the fan units:

1. Unlock the latch for that fan overhead.
2. Pull the overhead down.



Condensation management



CAUTION: During operation, avoid leaving the HP POD doors open, to minimize condensation conditions.

Supply chilled water that is above the dewpoint inside the HP POD to reduce condensation forming on the heat exchangers, and also cold enough to maintain the cold aisle temperature setpoint. If both conditions cannot be met during the HP POD startup, adjust either the chilled water or the cold aisle temperature setpoint above the dewpoint and then reduce it by decreasing the setpoint by one degree every fifteen minutes, until the desired operating setpoint is reached. During this process, the coils act as a dehumidifier and establish conditions inside the HP POD for sustained operation. Significant amounts of condensation might drain from the HP POD during the startup process, if the conditions inside the HP POD are very warm with high humidity.


During normal operation, some condensation might form on the heat exchangers, and it will be collected in the heat exchanger drip tray. The drip trays then collect and drain through the condensate drains out of the HP POD.

HP recommends connecting condensate drains on the HP POD to a facility drain to prevent the collection of water near the HP POD.

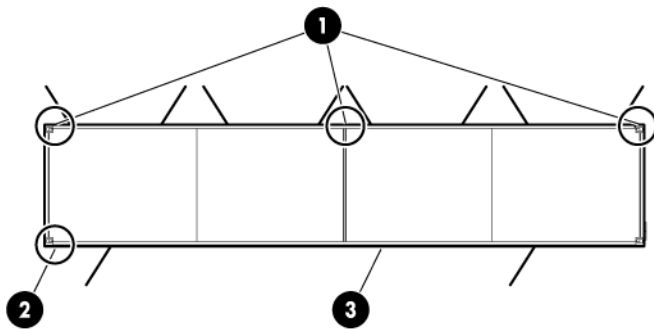
There are three 1.9 cm ($\frac{3}{4}$ inch) condensate drain outlets across the rear of the HP POD directly connected to the heat exchanger drip trays. The water main external drain is located at the front, left corner of the HP POD. A fifth drain is located on the (optional) humidifier. For specific drain locations, see HP POD drains (on page 31).

To avoid excessive buildup of condensate and to conserve energy, consider raising the chilled water temperature above the dewpoint to manage condensation while maintaining the necessary cooling capacity.


HP POD drains

 **WARNING:** Any water that drains around the HP POD causes a potential slip hazard. Use caution where slip hazards are present.

Water from natural condensation might form. Condensation from the heat exchangers flow to the three condensate drains across the rear of the HP POD (1). The water main drain catches any water from a water main leak (2). The humidifier drain removes excess water from the humidifier (3).



Item	Component
1	Heat exchanger condensate drains
2	Water main supply/return drain
3	Humidifier drain

 **IMPORTANT:** You might have to pipe directly to your local storm or sanitary drain, depending on local jurisdiction.

If your HP POD is located indoors, you can connect to an external drain line. If your HP POD is located outdoors, the drained water will simply drip from the HP POD drains out the back of the HP POD.

HP recommends connecting the condensate drains on the HP POD to a facility drain to prevent collection of water near the HP POD.

Leak detection

If too much water accumulates in a drain tray, an alarm is triggered and sent through the BMS, indicating that there might be a leak. For more information about alarms, see BMS alarms (on page 47).

Water quality requirements

Water quality requirements and specifications

- Closed-loop water must not contain any lime scale deposits or loose debris.
- The water must have a low level of hardness, particularly a low level of carbon hardness. Additionally, the water must not be so soft that it attacks the materials with which it comes into contact.
- The chilled water temperature to be supplied to the HP POD is 13°C to 24°C (55°F to 75°F). Freezing water might cause a blockage and damage to the unit. The heat transfer potential of the water is lower, so the equipment must be derated properly.

Acceptable water quality specifications

Water must be maintained per the following acceptable water quality standards.

Parameter	Range
pH	8.0–10
Specific conductance at 25°C (77°F)	0–2500 μ mhos/cm
Alkalinity ("M" as CaCO_3)	150–1000 ppm
Sulfur (SO_4)	0–150 ppm
Chloride (Cl)	0–100 ppm
Hardness (CaCO_3)	0–350 ppm
Calcium hardness (CaCO_3)	0–200 ppm
Magnesium hardness (CaCO_3)	0–150 ppm
Copper (Cu)	< 0.20 ppm
Iron (Fe)	< 3.0 ppm
Aluminum (Al)	< 0.50 ppm
Sodium (Na)	0–1000 ppm
Silica (SiO_2)	0–150 ppm
Zinc (Zn)	< 1.0 ppm
Manganese (Mn)	< 0.1 ppm
Phosphate Ortho- (PO_4)	< 3 ppm
Bacteria	< 1000 CFU/ml
Suspended solids	< 10 ppm

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

Frost damage

To avoid frost damage, the water temperature must not be allowed to fall below the minimum permissible temperature of +4 °C (+39.2 °F) at any point in the water cycle.

The water cycle must be drained completely using compressed air before storage or transportation at freezing temperatures or below.

Plumbing materials to avoid

Do not use the following materials in a closed water system:

- Oxidizing biocides
- Aluminum components
- Brass components with high levels of zinc
- Non-stainless steel Iron components

Water precautions

Take the following precautions before installation of the HP POD:

- Verify 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 in your building (bathroom, sink, drinking water).
- Ensure facility managers understand the additional load being added to the chilled water supply of the building. Be aware that the added heat load might affect other components being cooled by the chilled water plant.

Water temperature

Without a tempered water package, the temperature of the water supplied to the HP POD must be 13°C to 24°C (55°F to 75°F). Freezing water might cause a blockage and damage to the unit.

The minimum server inlet temperature is 10°C (50°F).

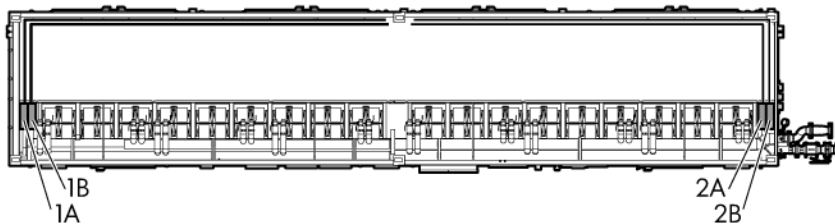
Power management

HP POD power

The electrical busway is a modular, overhead electrical distribution system that supplies power to the HP POD IT loads. The HP POD can be configured for either non-redundant power or redundant power.

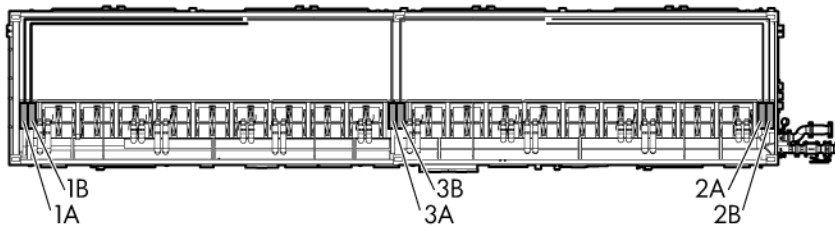
In the standard density HP POD there are four electrical busways.

- Non-redundant power installation—All four busways are powered from the same power source.
- Redundant power installation—The two A-side busways are powered from one power source and the two B-side busways are powered from an independent second power source.

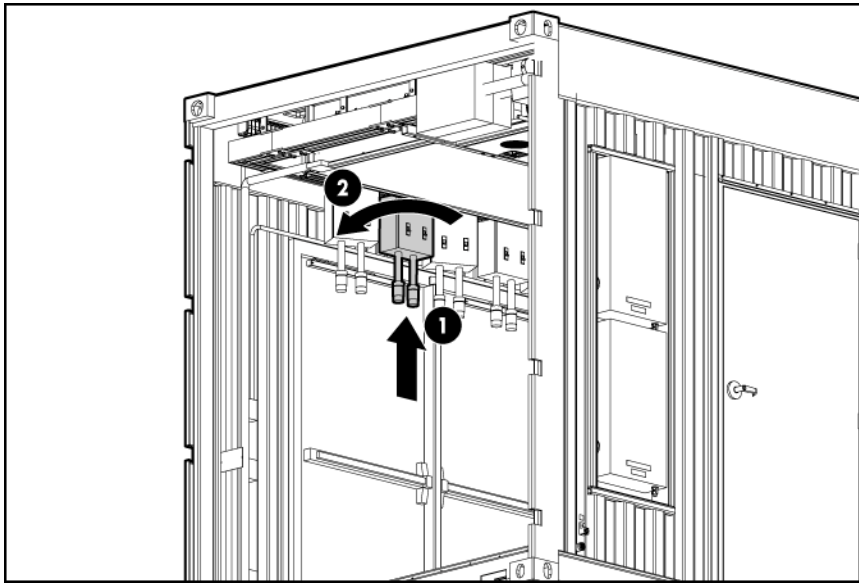


In the high density HP POD there are six electrical busways.

- Non-redundant power installation—All six busways are powered from the same power source.
- Redundant power installation—The three A-side busways are powered from one power source and the two B-side busways are powered from an independent second power source.



The internal electrical busways provide a location to connect each of the dropboxes, which then power the PDUs. The dropboxes should be staggered on the electrical busways; one connected to the A-side busway and the next connected to the B-side busway.



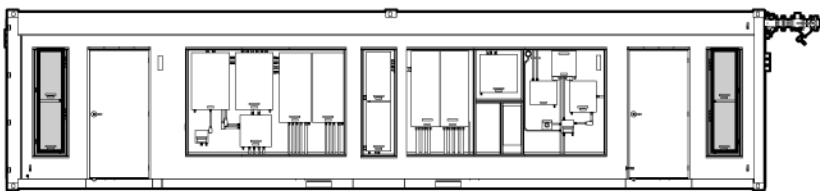
Disabling power

- To disable power to a single PDU, open the dropbox breaker feeding that PDU and disconnect the PDU from the dropbox.
- To disable power to a single rack, open the corresponding breakers on the dropboxes feeding each of the PDUs installed in that rack.
- To disable power to a single electrical busway, open the appropriate main breaker for that busway on the corresponding electrical busway panel outside of the HP POD.

Power distribution: Electrical busway enclosed circuit panels

Standard density HP POD

The standard density HP POD is powered by electrical busways on the ends of the unit.



Feature	Specification
Number of busways	4

Feature	Specification
Frequency	50-60 Hz
Amps (per busway)	225A
Neutral ampacity (per breaker)	225A
Amps derated percentage	10%
Max usable amps (per busway)	202A
Voltage (per busway)	380-415V
Grounding	Aluminum casing
Busway conductors	3 phases + neutral

NA standard density HP POD capacities

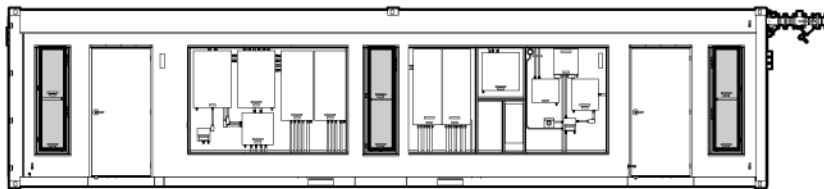
Feature	Capacity
Tier 1 configuration	450 kW
N + N configuration	291 kW
3 phase PDU capacity	17.28 kW
Thermal capacity limit	450 kW

International standard density HP POD capacities

Feature	Capacity
Tier 1 configuration	450 kW
N + N configuration	291 kW
3 phase PDU capacity	22 kW
Thermal capacity limit	450 kW

High density HP POD

The high density HP POD includes the electrical busways on the ends of the unit plus additional electrical busways in the center of the unit.



Feature	Specification
Number of busways	6
Frequency	50-60 Hz
Amps (per breaker)	225A

Feature	Specification
Neutral ampacity (per breaker)	225A
Amps derated percentage	10%
Max usable amps (per breaker)	202A
Voltage (per busway)	380-415V
Grounding	Aluminum casing
Busway conductors	3 phases + neutral

NA high density HP POD capacities

Feature	Capacity
Tier 1 configuration	600 kW
N + N configuration	380 kW
3 phase PDU capacity	17.28 kW
Thermal capacity limit	600 kW

International high density HP POD capacities

Feature	Capacity
Tier 1 configuration	600 kW
N + N configuration	436 kW
3 phase PDU capacity	22 kW
Thermal capacity limit	600 kW

Power distribution: Dropboxes, PDUs, and racks

NA standard density HP POD configurations

Configuration	Number of 3 phase PDUs per HP POD	Number of dropboxes per HP POD	Power capacity per rack	Total HP POD power capacity
4 x 225 Non-redundant	22	11	17.28 kW	450 kW
4 x 225 Redundant	44	22	17.28 kW	291 kW

International standard density HP POD configurations

Configuration	Number of 3 phase PDUs per HP POD	Number of dropboxes per HP POD	Power capacity per rack	Total HP POD power capacity
4 x 225 Non-redundant	22	11	22 kW	450 kW
4 x 225 Redundant	44	22	22 kW	291 kW

NA high density HP POD configurations

Configuration	Number of 3 phase PDUs per HP POD	Number of dropboxes per HP POD	Power capacity per rack	Total HP POD power capacity
6 x 225 Non-redundant	44	22	44 kW	600 kW
6 x 225 Redundant	44	22	17.28 kW	380 kW

International high density HP POD configurations

Configuration	Number of 3 phase PDUs per HP POD	Number of dropboxes per HP POD	Power capacity per rack	Total HP POD power capacity
6 x 225 Non-redundant	44	22	44 kW	600 kW
6 x 225 Redundant	44	22	22 kW	436.5kW

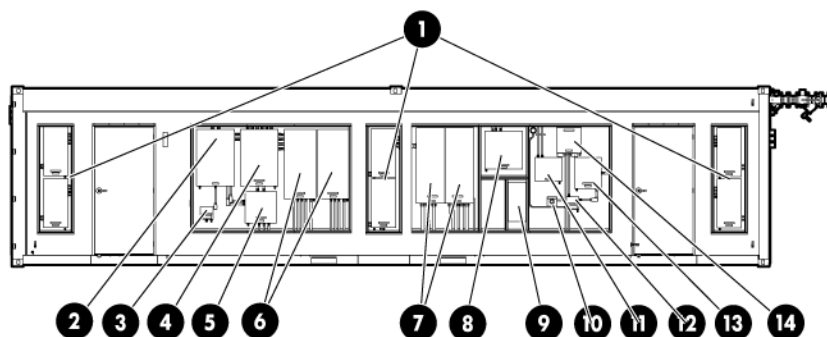
Rack power

Power is provided to each of the rack by PDUs. The PDUs can be moved around the HP POD to support component power requirements. The PDUs are powered by the drop boxes attached to each electrical busway.

For more information regarding power shortages to the PDUs or electrical busway drop boxes, see Troubleshooting (on page 54).

Panels

The following panels are on the exterior of the HP POD.



Item	Component	Description
1	Electrical busway enclosed circuit breaker (on page 40)	225A electrical panel board that power the electrical busways: <ul style="list-style-type: none"> Four electrical busway panels are installed in the standard HP POD. Six electrical busway panels are installed in the high density HP POD.
2	BMS panel (on page 39)	Building Management System
3	Auxiliary single-phase branch circuit power*	Provides auxiliary power for the BMS or convenience outlets. 100-120V, 60 Hz or 220-240V, 50 Hz owner-provided power.
4	Fan control (FC) panel ("Fan control panel" on page 42)	Fan speed control panel
5	House relay transfer panel (on page 42)	Automatically transfers house loads from House panel A to House panel B when primary power is lost
6	House panels A and B ("House panels" on page 42)	125A electrical panel boards that provides all HP POD electrical requirements, except for the IT equipment
7	Junction boxes	Main power input boxes for incoming electrical feeder cables
8	Security panel ("Security panel location" on page 42)	Reserved for installing interface and power requirements for any optional security devices installed.
9	Humidifier (on page 49)*	Maintains the humidity inside the HP POD within a set range
10	EPO button	Emergency power off actuator that cuts off all power to the POD and activates the EPO alarm lamp.
11	ASSD panel (on page 39)	Air sampling smoke detection system
12	Fire alarm XFMR	Powers 120V Fire Alarm system components, if required
13	Fire alarm control panel (on page 42)	Contains controls and status indicators for the fire alarm system
14	EPO panel (on page 40)	Contains controls and status indicators for the EPO system

*Optional component ("Optional components" on page 49)

ASSD panel

The ASSD panel contains an aspirating smoke detection system that draws air from the piping network inside the HP POD and monitors the smoke levels in the air. If smoke is detected, the ASSD panel automatically sends an alarm to the prewired Fire Alarm Control Panel.

No user interface settings are required. Interface is established through the Fire Alarm Control Panel.

For more information, see the product documentation included in the *Operations & Maintenance Manual* ("Component documentation" on page 10).

BMS panel

The BMS panel monitors the HP POD environmental conditions and determines optimum operating conditions for the cooling system based on the existing work load. The BMS panel also enables you to connect the HP POD to your building management system. You must bring an Ethernet cable through the internal passway to connect to the BMS panel.

You can connect with a laptop locally through an Ethernet browser-based system. For more information, see [Managing BMS settings from the HP POD \(on page 47\)](#).


There is no external user access to the HP POD BMS panel, and all interface settings are controlled through your facility BMS.

For more information, see [Connecting the HP POD to the BMS \(on page 43\)](#).

Electrical busway enclosed circuit breaker

The electrical busway panels are enclosed circuit breakers that provide power to each of the electrical busways. For more information, see [Electrical busway \("HP POD power" on page 34, "Power distribution: Electrical busway enclosed circuit panels" on page 35\)](#).

EPO Panel

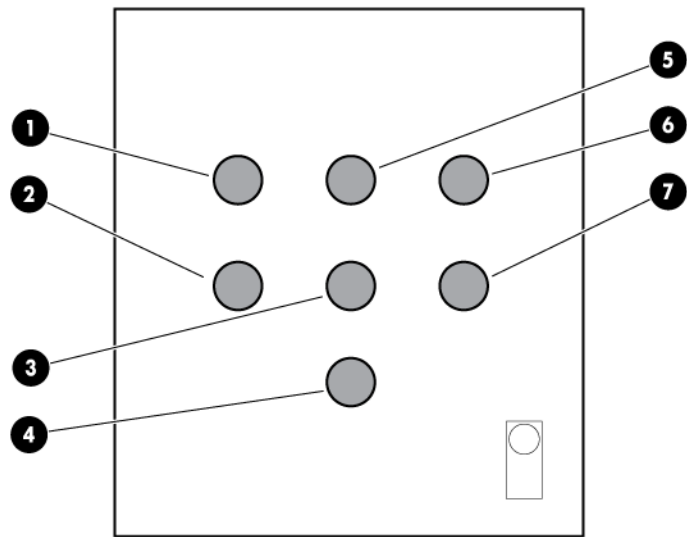
 **IMPORTANT:** If the remote powered 120V branch circuits are operational, they are not turned off during an EPO shutdown.

The EPO panel contains controls and status lamps for the EPO system, which enables all power in the HP POD to be turned off except for emergency lighting. Power to the EPO panel is single-phase 240V AC, provided by the house panel.

Two EPO alarm buttons for directly shutting off non-emergency HP POD power are located inside the HP POD, and one EPO alarm button is located on the outside of the HP POD.

To check that the EPO alarm buttons and alarms are functional, switch to Test mode and then press an EPO alarm button. This procedure activates the EPO alarms without cutting off power to the HP POD.

To enable remote access to the EPO system, switch to Bypass mode.



Callout	Component	Description
1	Power On LED	Indicates the EPO is functional, and operating in Test mode, Armed mode, or Bypass mode.

Callout	Component	Description
2	EPO Armed mode LED	Indicates the EPO is operating in Armed mode.
3	Reset button	Resets the EPO system after an EPO alarm has been triggered.
4	Three way key-operated switch	Sets the EPO operating mode (Test, Armed, or Bypass).
5	System alarm/ EPO shutdown (red)	Indicates an EPO alarm has been triggered and non-emergency HP POD power has been shut off.
6	System Test mode LED (amber)	Indicates the EPO is undergoing a system test.
7	EPO Bypass mode LED (green)	Indicates the EPO is in Bypass mode.

After an EPO alarm, reset the EPO system:

1. Use the button key release mechanism to restore the EPO alarm buttons to their normal state.
2. Reset the main breaker in the House panel.
3. Reset the electrical busway breakers.
4. Press the Reset button on the EPO panel.

EPO modes

The EPO panel operates in three modes: Armed, Test, and Bypass. The operating mode is determined by the status of a key-operated selector switch on the EPO panel. The switch status can be reported to a monitoring system that is external to the POD.

Armed mode—Pressing a red EPO button on the POD causes the following events:

- The red System Alarm/EPO Shutdown light on the EPO panel illuminates to indicate that an EPO switch has been activated. (This light remains illuminated until all EPO buttons are restored to their normal state by means of a key release mechanism, and the Reset button on the EPO panel is pressed.)
- The EPO activated relay is energized and sends a signal to the EPO panel to energize the associated control relays.
- The control relays within the EPO panel shut down the affected circuit breakers in the POD.

Test mode—All associated EPO functions are disabled, and the amber System Test Mode light on the EPO panel is illuminated. This mode enables the EPO buttons to be tested without removing power to the POD. When an EPO button is pressed, the EPO Activated relay is energized, and it energizes the associated control relays in the EPO panel. Although the EPO functions are disabled, the horn and strobe alarm are activated. To silence the alarm, press the Reset button on the EPO panel.

Bypass mode—All EPO functions and test functions are disabled. When the EPO panel is operating in this mode, the green EPO Bypass light on the EPO panel is illuminated.

Fan control panel

The Fan Control panel houses the relay system that controls the fan speeds within the HP POD, based on maintaining the cold aisle temperature set through the BMS.

You do not have to access to the Fan Control panel, and no interface setting is required.

Fire alarm control panel

If you connect your central fire alarm system to the fire alarm control panel, any emergency alarm can be sent directly over your facility alarm system.

For more information about the fire alarm control panel, see the product documentation included in the *Operations & Maintenance Guide*.

House panels

The House panel is a 125A panel board that provides power and electrical requirements to all auxiliary HP POD components.

- House panel A provides the primary power to all loads.
- House panel B provides backup power to all auxiliary loads, if the primary power fails.
- The House relay transfer panel automatically transfers the loads from House panel A to House panel B in the event of a power failure.

If a breaker is tripped open, you can access to the outside of the House panel and reset the breakers. You can also reset the HP POD components after an EPO alarm. If one or more breakers continually trip, contact HP ("[HP contact information](#)" on page 60).

The standard panel schedule resides inside the panel breaker box and can be referenced when necessary.

House relay transfer panel

The House relay transfer panel automatically transfers the loads from House panel A to House panel B in the event of a power failure.

Security panel location

If you decide you want to install a security panel, the HP POD has a predesignated location for a security panel.

Building management system

Using a building management system (BMS)

NOTE: If your site does not have a BMS, then BMS data can be sent to and viewed from a set IP address, communicating via Ethernet cable connected to the internal passway of the BMS Panel.

HP recommends connecting the HP POD to your facility BMS, communicating through Ethernet cable connected to the internal passway of the BMS Panel. For more information, see [Connecting the HP POD to the BMS](#) (on page [43](#)).

The standard BMS protocol, BACnet, is a data communication protocol for building automation and control networks. Connecting across different BACnet protocols might require additional engineering labor and coordination between your in-house control manufacturer and HP.

A BMS offers:

- A supported communication interface that can monitor and control certain HP POD components remotely
- Immediate notification of all alarm messages

By connecting your HP POD to a BMS system, you can monitor:

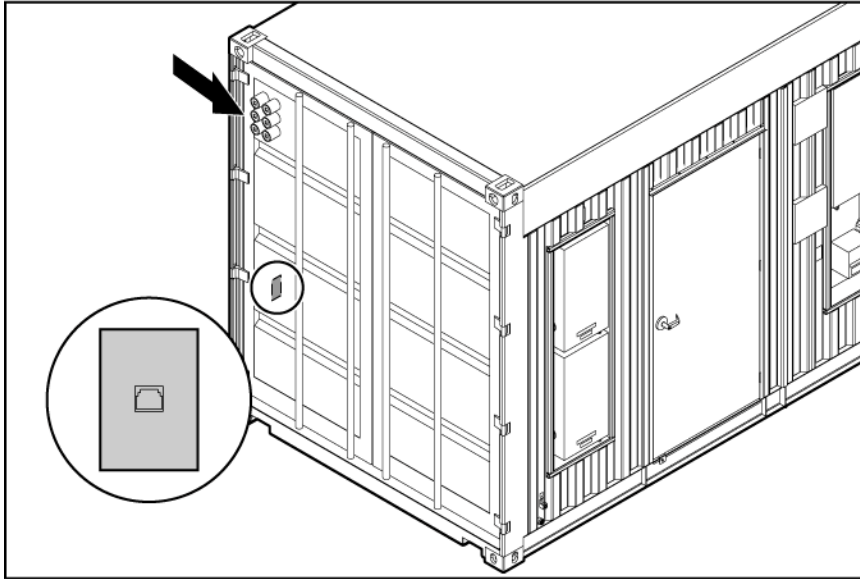
- Cold and hot aisle temperatures
- Supply and return water temperatures
- Chilled water flow rate entering the HP POD
- Smoke alarms
- EPO alarms

For additional points that can be monitored, see the I/O controls points list (on page [61](#)) in the Appendix.

Connecting the HP POD to the BMS

1. Install and configure the operating system (Microsoft® Windows® or Linux) on a designated management server.
2. Install the management software on the management server.
3. Connect the management servers to the building network.
4. Insert your BMS Ethernet cable through the IT portals on the left end of the HP POD.

5. Plug the Ethernet cable into the designated BMS jack on the interior of the HP POD.



For more information, see the Johnson Controls system documentation included in the *Operations & Maintenance Manual* ("[Component documentation](#)" on page 10).

Logging into the BMS

1. Install and configure JAVA JRE 1.6.0_07-b06. You must have this version of Java™.



2. Turn on DHCP in order for your laptop to use the Ethernet port.
3. Plug the Ethernet cable into the designated BMS jack on the interior of the HP POD. You might receive a limited connection warning.
4. Retrieve the HP POD MAC address from the inside of the BMS panel on the exterior of the HP POD.
5. Open Internet Explorer.
6. Select the red **X** in the toolbar to stop the explorer from searching for the proxy.

7. Enter `http://naeXXXXXXXXXXXX/metasys` in the address bar. XXXXXXXXXXXX is your unique MAC address. The Johnson Controls welcome screen appears and a Java™ starting window opens.

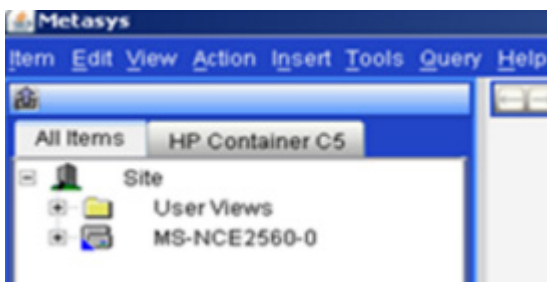


NOTE: HP will provide your login username and password.

8. Login on the Johnson Controls login page.



9. To view the status points:
 - a. Select the **All Items** tab on the left side of the page.



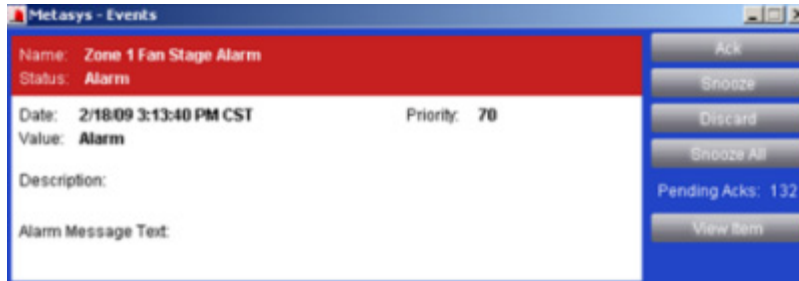
- b. Select the **User Views** folder. Click the + to expand the folder and see all subcategories.
 - c. Select any subcategory to view its status and description.

Snoozing alarms

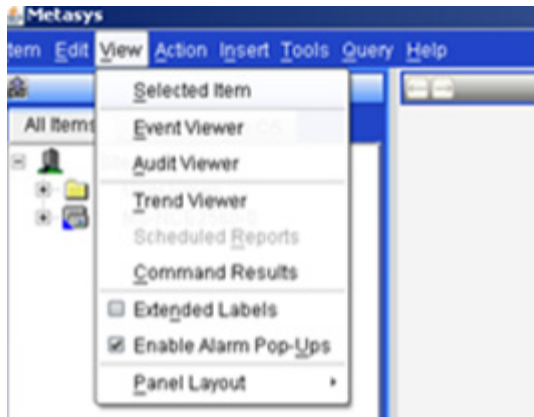
While viewing HP POD status points, alarms will continue to pop up on your menu bar. The alarms are normal during the commissioning process.

To snooze the alarms:

1. When the alarm pane appears, select **Snooze**.

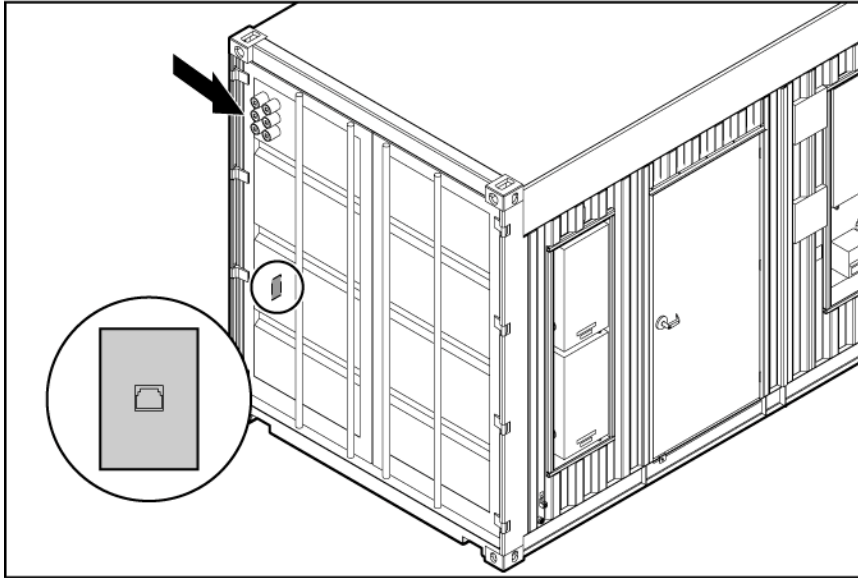


2. Select **View** from the Main Menu bar.
3. Select the **Enable Alarm Pop-Ups** to uncheck the box. The alarms will no longer appear until you re-enable the alarm pop-ups.



Managing BMS settings from the HP POD

The BMS controls can be accessed from a laptop if necessary. To access the BMS using a laptop at the HP POD, connect an Ethernet cable between a laptop and the designated BMS jack on the interior of the HP POD.



BMS alarms

The alarms pertaining to the health of the HP POD and its components are relayed through the BMS.

Alarm	Meaning	Solution
Fan failure	One of the fans is not working.	If you are still within your service contract, contact HP service.
Sensor failure	One of the sensors is not working.	If you are still within your service contract, contact HP service.
Leak detection	The drain tray senses water.	Turn off the water flowing into your HP POD at the facility line. Turn off all IT components, so that the components do not overheat. If you are still within your service contract, contact HP service.
Change filter*	The return air filters are full.	Replace the return air filters.
High temperature	The cold aisle temperature has surpassed the set point temperature.	Check to make sure that you have water flowing into your HP POD and that the fans are blowing. If you are still within your service contract, contact HP service.
Low temperature	The cold aisle temperature is too low.	Check your HP POD components to make sure all components are operating as normal. If you are still within your service contract, contact HP service.

Alarm	Meaning	Solution
EPO	Someone has activated the EPO system and shut down the HP POD.	Follow emergency procedures. After the emergency is cleared, reset the EPO and other HP POD systems.

*The change filter alarm is only relayed to your BMS if you have the optional filter replacement sensor installed.

Safety and security alarms

Alarms pertaining to the safety of the HP POD are (optionally) relayed through your building fire and security dispatch.

Alarm	Meaning	Solution
Fire alarm*	A fire has been detected in the HP POD.	Activate the EPO. Follow emergency procedures for your facility.
Security alarm (optional)	There has been a security breach.	Follow emergency procedures for your facility.
EPO	Someone has activated the EPO system and shut down the HP POD.	Follow emergency procedures for your facility.

*The fire alarm is only relayed to your building fire and security dispatch if you have connected your facility to the fire alarm panel.

Fire alarm sequence of operations

If a fire alarm or manual pull station is activated, the HP POD follows this sequence of operations.

1. The HP POD sends an alarm signal to the building fire and security dispatch.
2. The HP POD security lights flash and the horns sound the 30-second evacuation alarm.
3. After a 30-second delay, the HP POD releases the suppressant gas, if the optional fire suppressant system is installed.

Optional components

Additional insulation

You can choose to have additional insulated paint added to your HP POD prior to shipment. The additional insulation allows you to lower your operating temperature in climates prone to freezing.

Air filter sensor

The air filter sensor is an optional component that, if installed, alerts you to change your air filters. The sensors are located near each of the eighteen air filters. If the air filters are full and should be replaced, an alert will be sent via your BMS.

EPMS panel

The EPMS panel provides a location for mounting an optional electrical power monitoring system.

Fire protection system

The fire protection system is a HP POD self-contained system, with no connection to your BMS. The fire protection system consists of 3M Novec 1230, a clean agent fire suppressant, eliminating the need for additional water to be connected to the HP POD in case of a fire emergency.

Humidifier

If you choose to connect to the humidifier, it maintains the humidity within the HP POD within a set range, according to ASHRAE standards.

Maintaining the humidity helps to minimize static electricity within the HP POD.

For more information about the humidifier, see the product documentation included in the *Operations & Maintenance Manual* ("[Component documentation](#)" on page 10).

HP POD security

Routing raceways for the following security options are provided by HP to support the installation of a customer-specified security system. The customer-specified system can be installed as a custom service option. You are responsible for providing additional hardware, cabling, and controllers to support these options.

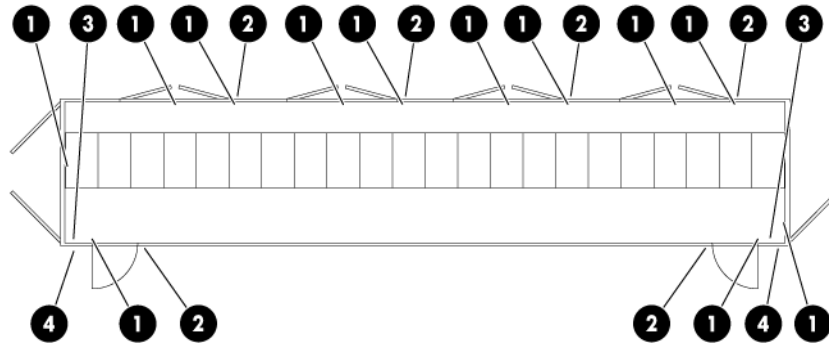
Security options:

- Key lock hardware—Standard security provided

- Card reader security—Junction boxes provided at every entrance to upgrade security.
- Magnetic or electronic locks—Prewiring provided at every entrance to upgrade security. Magnetic or electronic locks are not provided.
- Internal/external cameras—Camera mounting locations are provided along with empty conduit and pull drag lines.

Each external panel is secured through key lock hardware.

The following locations have been prewired for your own security upgrades.



Callout	Description
1	Prewired junction box locations
2	Card reader locations
3	Internal camera locations
4	External camera locations

Transformers and switchboards

HP offers several transformers and switchboards to supply your power needs.

On-site connections include:

- From your main facility power to the primary side of the transformer
- From the transformer to the switchboard
- From the feeder breaker lugs within the switchboard assembly to the HP POD

The standard cables should allow for placing the transformer and switchboard approximately 3.0 m (10 ft) away from the HP POD. Installation costs assume that connections are within the 3.0 m (10 ft) recommendation. If you place the transformer and switchboard more than 3.0 m (10 ft) away from the HP POD, additional planning and costs are involved.

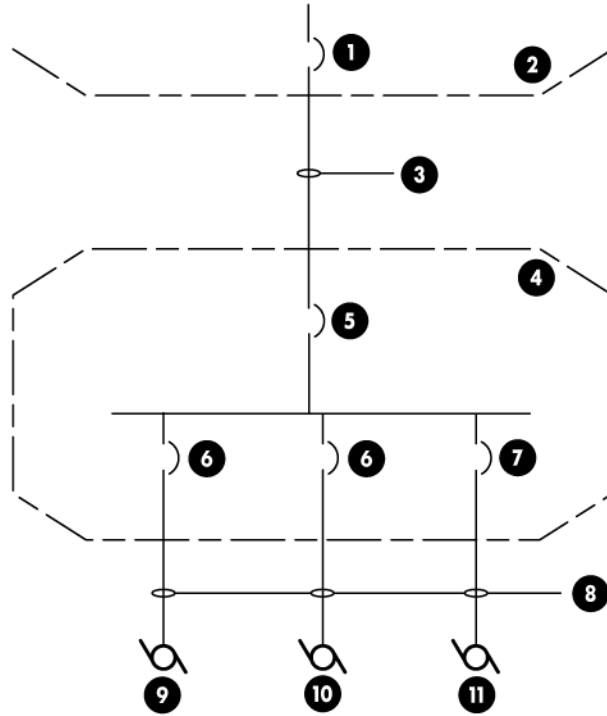
Tempered water package

HP recommends using the optional tempered water package to provide water to your HP POD. For more information about the kit, see Tempered water package components ("[Tempered water package components \(optional\)](#)" on page 17).

NOTE: The tempered water package pipes are flushed prior to shipment.

The tempered water package is enclosed within a 10 ft ISO container that includes internal lighting and heating. The heater comes equipped with a programmable thermostat that you can set to run as needed to ensure the water temperature inside does not drop below freezing.

Electric power distribution diagram for the tempered water package



Callout	Specification
1	30 AT, 30 AF, 3P
2	Within facility 480V, 3 phase power distribution equipment
3	(3)#10, (1)#10G, 1"C. Feeder sized on a maximum run of 100 ft
4	Motor controller at skid
5	30 AT, 30 AF, 3P
6	20 AT, 3P
7	15 AT, 3P
8	(3)#12, (1)#12G ¾"C
9	P-1
10	P-2
11	UH-1

Frequently asked questions

HP POD frequently asked questions

Question	Answer
Can I keep the HP POD on the trailer?	Yes, if you choose to lease the trailer from HP or if you purchase your own trailer and have the HP POD installed on your trailer prior to shipment. You must also: <ul style="list-style-type: none">• Ensure that the site is stable and has been prepared correctly for the additional weight of the trailer.• Provide a work platform to access exterior panels.
What cooling capacity ranges are available in the HP POD?	The HP POD is capable of cooling rack-mounted components consuming up to 600 kW of electrical power.
What electrical power capacity ranges are available in the HP POD?	The standard HP POD is capable of powering components up to 450 kW of electrical power. The high density HP POD is capable of powering components up to 600 kW of electrical power.
Can the level of heat removal be regulated in proportion to the waste heat generated?	Yes, the control system automatically adjusts the air flow to remove heat generated in the HP POD.
How is water connected to the HP POD?	There are two options to connect water: <ul style="list-style-type: none">• You directly connect your facility water to the HP POD, making sure the water meets the water requirements ("Water quality requirements" on page 32) for quality, temperature, and flow rate.• You connect your facility water to the tempered water package, which is then connected to the HP POD through two 4-in 150-psi hoses.
Does the HP POD require maintenance?	Yes, general maintenance is outlined in this document. Contact HP service for additional information.
Does condensation form?	During normal operation some condensation might form, but the condensation does not reach any rack-mounted components or cause any damage. Excess condensation from the heat exchangers is collected and drained via three condensate drains (" HP POD drains " on page 31) across the rear of the HP POD. In most cases, the condensation evaporates prior to reaching the condensate drains.
How does the HP POD control humidity?	The relative humidity is maintained between 30–70%. If additional humidity is required (consistently below 30%), consider installing the optional humidifier (on page 49).
Does the air flow within the HP POD produce static electricity?	The humidity of the HP POD is maintained between 30–70% to ensure that dangerous levels of static electricity cannot build.

Question	Answer
Is the HP POD weather resistant?	If there is an external leak, the HP POD is weatherproof and has sufficient protection against the encroachment of water inside the HP POD.
What happens if there is an internal leak?	If there is an internal leak, the water collects in the condensation drain pans or the water main drain pan. The additional water present in the condensation drain pan triggers a Leak Detection alarm, sent over the BMS.
What will happen if water stops flowing to the HP POD?	The building BMS receives a High Temperature alarm. An EPO will occur automatically if the hot aisle temperature exceeds 66°C (150°F). HP recommends shutting down all IT components or pressing any EPO button to manually power down the servers, to maintain server health, until the root problem can be solved.
At what smoke level will an alarm be issued?	You can set the four different ranges at which the ASSD panel smoke detector issues an alarm. For more information, see the smoke detector manual supplied with the HP POD.
Can I switch out my servers and other rack-mounted components?	The HP POD supports any IT equipment that uses front to rear air flow cooling to maintain thermal integrity. If you must remove a server or other rack-mounted component for any prolonged period, you must replace it with a similar component or a heavy-duty blanking panel so that the HP POD interior can maintain thermal integrity.
How will I be notified if there is an emergency in the HP POD?	The smoke alarm automatically detects incipient fires and activates several different types of fire alarms: <ul style="list-style-type: none"> • Visible—Internal and external HP POD strobes • Audible—Horn • Remote notification through the building fire alarm control panel (optional) Water emergencies are detected through the fire alarm control panel and drain trays, an alarm is initiated, and the building BMS is notified, if desired. If the fans are not functioning correctly, an alarm is initiated and the building BMS is notified, if desired.

Troubleshooting

HP POD troubleshooting

Issue	Resolution
The water is not flowing, or flowing too slowly.	Verify that all applicable valves are open. Inspect the water lines for blockage, unblock, or replace them as necessary.
The HP POD is overheating.	<p>If the fan is not functioning, check the integrity of the electrical connection to the fan. If the electrical connection seems OK, replace the fan.</p> <p>If the fan is functioning, check for a kink or blockage in the water line to the heat exchanger.</p> <p>Make sure there is no empty U space in the racks. A heavy duty filler panel should cover every empty location.</p> <p>Contact HP service.</p>
The strobe lights are flashing.	Either the EPO or the fire alarm system has been activated. Get out of the HP POD immediately and follow standard emergency procedures for your facility.
There is a leak inside the HP POD.	Locate and note the source of the leak. Prevent the leaking water from contacting any electrical equipment. Repair the leak as soon as possible.
There is no power to one rack.	<ol style="list-style-type: none">1 Verify that the racks on either side of the rack have power.2 Check the status of the busway dropbox for that rack.<ul style="list-style-type: none">• If a breaker has tripped, reset the breaker box and verify that power has been restored to the rack.• If none of the busway dropbox breakers has tripped, check the status of the PDUs for the rack. If the input or output breakers have tripped, reset the PDU and verify that power has been restored to the rack.• If none of the breakers on the busway dropbox or PDUs have tripped, replace the busway dropbox.
There is no power to multiple racks.	<ol style="list-style-type: none">1 Verify that the HP POD is receiving power.2 Check the status of each of the electrical busway panels. If one of the breakers has tripped, reset the breaker and verify that power has been restored to the racks.3 Check the status of the connection transformer and switchboard. If one of the breakers has tripped, reset the breaker and verify that power has been restored to the racks.
There is no power to the HP POD.	Check the status of the connection transformer and switchboard. If one of the breakers has tripped, reset the breaker and verify that power has been restored to the HP POD.

Specifications

HP POD specifications

Features	Specifications
Dimensions	12 m x 2.4m x 2.7m (40 ft x 8 ft x 9.5 ft)
Maximum weight	11,340 kg (25,000 lb) empty- 50,348 kg (111,000 lb) fully-loaded
Maximum power/ cooling	<ul style="list-style-type: none">• 450 kW Standard HP POD• 600 kW High density HP POD
Maximum rack quantity	22 racks
Rack Units (RU) per rack	50 RU
Rack Units (RU) maximum	1100 RU
Nominal power/ cooling per rack	25 kW
Maximum power/ cooling per rack	35 kW
Power input voltage	380-415 VAC, 3 Phase, 50/60 Hz, with neutral
Power distributed internally	Through 4 or 6 225A electrical busways 220-240/380-415 VAC, 50/60 Hz
Customer access	Double-door on one end Customer access—Two 1 m x 2.1 m (3 ft x 7 ft) doors to the cold aisle Rear component access—Four 1.8 m x 2.1 m (6 ft x 7 ft) doors to the hot aisle
Network supported	Bulk cable pass-through-fiber Bulk cable pass-through-copper (Optional) External rated DEMARC box

Electrical specifications

Panel information

Feature	Busway endfeed panels	House panels
Number of panels	<ul style="list-style-type: none">• 4 (Standard density HP POD)• 6 (High density HP POD)	2
Capacity	225A, 3-phase	125A, 3-phase
Poles (per panel)	1, 3-pole enclosed circuit breaker	30 pole positions

Input circuit breaker information

Feature	Electrical busway breakers	House breakers
Number of breakers	1 per busway	1 per panel (main)
Main breaker size	225A	125A (main)
Branch circuit breaker size	N/A	Up to 30 poles
General characteristics	<ul style="list-style-type: none">• 3-pole• 100% rated• thermalmagnetic trip• 25 kA interrupt capacity• provide with shunt trip coil	<ul style="list-style-type: none">• 1-pole or 2-pole• sized per panel schedule• thermalmagnetic trip• 14 kA interrupt capacity

Fire alarm panel connections

The electrical layout of the fire alarm system is as described in the schematic drawing supplied with the HP POD.

Water specifications

Water supply specifications without a tempered water package

Feature	Specification
Facility input temperature to HP POD	13° to 24°C (55° to 75°F)
Operating pressure	137 to 172 kPa (20 to 25 psi)
Rated pressure max	1,034 kPa (150 psi)
HP POD pressure drop	110 kPa (16 psi)
HP POD water flow rate	908.5 l/min (240 gal/min)
Chilled water supply and return connections	(2) 10.16 cm (4 inch) 150# flange
Humidifier	3.79 l/hr (1 gal/hr) domestic water from an alternate supply source

Water supply specifications with a tempered water package

Feature	Specification
Facility input temperature to the tempered water package	4° to 10°C (40° to 50°F)
Tempered water package temperature output to the HP POD	13° to 24°C (55° to 75°F)
Operating pressure	137,895 to 172,369 Pa (20 to 25 psi)
Rated pressure max	1,034,213 Pa (150 psi)
HP POD pressure drop	110,316 Pa (16 psi)

Feature	Specification
Tempered water package pressure drop	34,474 Pa (5 psi) max
Water flow rate to the tempered water package	757 to 1,893 l/min (200 to 500 gal/min) based on a facility operating delta T range of 6° to 12°C (10°–20°F)
Tempered water package flow rate to the HP POD	908.5 l/min (240 gal/min)
Chilled water supply and return connections	(2) 10.16 cm (4 inch) 150# flange
Humidifier	3.79 l/hr (1 gal/hr) domestic water from an alternate supply source

Rack specifications

Standard HP POD racks (AN982A)

Feature	Specification
U height	50U
Width	546 mm (21.5 in)
Depth	1,000 mm (39.4 in)
Maximum load weight	1,360.7 kg (3,000 lb)

Shock-mounted HP POD racks (AT052A)

Feature	Specification
U height	46U
Width	546 mm (21.5 in)
Depth	1,000 mm (39.4 in)
Maximum load weight	1,251.9 kg (2,760 lb)

Thermal and air flow performance

Maximum thermal and air flow performance parameters	HP POD specification
Air temperature—Inlet to rack-mounted components	Hot aisle setpoint temperature in BMS
Chilled water temperature	12°–24°C (55°–75°F)
Total rack-mounted component air flow	Variable as required to maintain hot aisle setpoint temperature
Heat rejection capacity	600 kW

Environmental specifications

Features	Specifications
Operating temperature	-28.9°C to 54.4°C (-20°F to 130°F)
Non-operating temperature*	2°C to 54°C (35°F to 130°F)
Transit temperature**	-30°C to 60°C (-22°F to 140°F), up to 72 hours
Operating humidity	<ul style="list-style-type: none">• 15% to 80% relative noncondensing• 26°C (79°F) maximum wet bulb temperature
Non-operating humidity*	<ul style="list-style-type: none">• 5 to 95% relative noncondensing• 39°C (102°F) maximum wet bulb temperature
Operating altitude	-76.2 to 3,048 m (-250 to 10,000 ft)
Non-operating altitude	-76.2 to 9,144 m (-250 to 30,000 ft)

*For non-operating specifications, consider the temperature of computer and IT equipment inside the HP POD.

**The HP POD must be drained before it is moved to a new location.

For areas prone to freezing, consult HP for applicable operating solutions and evaluate water lines as described in the Frost damage (on page 33) section of this document.

Tempered water package specifications

Feature	Specification
Dimensions	10 ft x 8 ft x 9 ft
Tank capacity	7.8 gal
Pumps electrical	480V, 3-phase, 60 Hz
Pumps flow	240 gal/min
Chemical pot feeder capacity	10 gal

For more information, see Water specifications (on page 56).

Maintenance

Periodic maintenance

Perform periodic inspections of the POD to ensure there is no sign of overheating. During periodic inspections, pay special attention to electrical connections and wiring.

Electrical busway maintenance

Periodically tighten the electrical busway connections. HP recommends tightening the electrical busway connections every six months.

Inspect the busway drop boxes for loose connections, and tighten if necessary.

Water system maintenance

You must maintain your water system quality. Consult a water treatment specialist to perform the following maintenance:

Flush the HP POD

How often you must flush the HP POD depends on how often you shutdown the HP POD and the water quality.

Maintain water quality

The water treatment specialist should periodically take a water sample and add new chemical treatments to the HP POD water or tempered water package as needed to maintain the specified water quality ("[Water quality requirements](#)" on page 32).

Air filter replacement

There are eighteen 14 in x 20 in x 1 in air filters inside the HP POD.

If you have the optional air filter sensor (on page 49) installed, you will be notified through your BMS when you need to change a filter.

If you do not have the sensor installed, HP recommends periodically inspecting and changing each air filter. You can replace an air filter during normal HP POD operation.

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).

Before you contact HP

Be sure to have the following information available before you call HP:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Product identification number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP contact information

For the name of the nearest HP authorized reseller:

- See the Contact HP worldwide (in English) webpage (<http://welcome.hp.com/country/us/en/wwcontact.html>).

For HP technical support:

- In the United States, for contact options see the Contact HP United States webpage (http://welcome.hp.com/country/us/en/contact_us.html). To contact HP by phone:
 - Call 1-800-HP-INVENT (1-800-474-6836). This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.
 - If you have purchased a Care Pack (service upgrade), call 1-800-633-3600. For more information about Care Packs, refer to the HP website (<http://www.hp.com/hps>).
- In other locations, see the Contact HP worldwide (in English) webpage (<http://welcome.hp.com/country/us/en/wwcontact.html>).

Appendix

I/O controls points list

The points list table is a sample of possible point information. The information included might be different for your site and customized HP POD.

<i>Electrician/ Fitter</i>		<i>Point Information</i>		<i>Controller Information</i>			<i>Panel Information</i>	
Controller	Point Type	Object Name	Expanded ID	Controller Details	Trunk Type	Cable Destination Bay	Panel Detail Reference	Cable Number
NCE	UI IN-1	CA1-T	Cold aisle Zone 1 Temperature	NCE25xx	MS/TP	UI IN-1	F131	1-4-UI IN-1
NCE	UI IN-2	CA2-T	Cold aisle Zone 2 Temperature	NCE25xx	MS/TP	UI IN-2	F131	1-4-UI IN-2
NCE	UI IN-3	CA3-T	Cold aisle Zone 3 Temperature	NCE25xx	MS/TP	UI IN-3	F131	1-4-UI IN-3
NCE	UI IN-4	CA4-T	Cold aisle Zone 4 Temperature	NCE25xx	MS/TP	UI IN-4	F131	1-4-UI IN-4
NCE	UI IN-5	CA5-T	Cold aisle Zone 5 Temperature	NCE25xx	MS/TP	UI IN-5	F131	1-4-UI IN-5
NCE	UI IN-6	CA6-T	Cold aisle Zone 6 Temperature	NCE25xx	MS/TP	UI IN-6	F131	1-4-UI IN-6
NCE	UI IN-7	ZN1- DP	Zone 1 Differential Pressure	NCE25xx	MS/TP	UI IN-7	F106	1-4-UI IN-7
NCE	UI IN-8	ZN2- DP	Zone 2 Differential Pressure	NCE25xx	MS/TP	UI IN-8	F106	1-4-UI IN-8
NCE	UI IN-9	ZN3- DP	Zone 3 Differential Pressure	NCE25xx	MS/TP	UI IN-9	F106	1-4-UI IN-9
NCE	UI IN-10	ZN4- DP	Zone 4 Differential Pressure	NCE25xx	MS/TP	UI IN-10	F106	1-4-UI IN-10
NCE	BI IN-11	CoilPanW D1-A	Coil Pan Water Detector Alarm	NCE25xx	MS/TP	BI IN-11	F301	1-4-BI IN-11
NCE	BI IN-12	CoilPanW D2-A	Coil Pan Water Detector Alarm	NCE25xx	MS/TP	BI IN-12	F301	1-4-BI IN-12
NCE	BI IN-13	CoilPanW D3-A	Coil Pan Water Detector Alarm	NCE25xx	MS/TP	BI IN-13	F301	1-4-BI IN-13
NCE	BI IN-14	PipeWD1-A	Pipe Water Detector Alarm	NCE25xx	MS/TP	BI IN-14	F301	1-4-BI IN-14

NCE	BI IN-15	CoilPanW D4-A	Coil Pan Water Detector Alarm	NCE25xx	MS/TP	BI IN-15	F301	1-4-BI IN- 15
NCE	BI IN-16	PipeWD2- A	Pipe Water Detector Alarm	NCE25xx	MS/TP	BI IN-16	F301	1-4-BI IN- 16
NCE	BI IN-17	PipeWD3- A	Pipe Water Detector Alarm	NCE25xx	MS/TP	BI IN-17	F301	1-4-BI IN- 17
NCE	BI IN-18	FloorWD1- A	Floor Water Detector Alarm	NCE25xx	MS/TP	BI IN-18	F301	1-4-BI IN- 18
NCE	BO OUT-1	Unused	Unused	NCE25xx	MS/TP	BO OUT-1	Unused	1-4-BO OUT-1
NCE	BO OUT-2	Unused	Unused	NCE25xx	MS/TP	BO OUT-2	Unused	1-4-BO OUT-2
NCE	BO OUT-3	Unused	Unused	NCE25xx	MS/TP	BO OUT-3	Unused	1-4-BO OUT-3
NCE	BO OUT-4	Unused	Unused	NCE25xx	MS/TP	BO OUT-4	Unused	1-4-BO OUT-4
NCE	BO OUT-5	Unused	Unused	NCE25xx	MS/TP	BO OUT-5	Unused	1-4-BO OUT-5
NCE	BO OUT-6	Unused	Unused	NCE25xx	MS/TP	BO OUT-6	Unused	1-4-BO OUT-6
NCE	BO OUT-7	Unused	Unused	NCE25xx	MS/TP	BO OUT-7	Unused	1-4-BO OUT-7
NCE	CO OUT-8	ZN5Fan-O	Zone 5 Fan Output	NCE25xx	MS/TP	CO OUT-8	F1059	1-4-CO OUT-8
NCE	CO OUT-9	ZN6Fan-O	Zone 6 Fan Output	NCE25xx	MS/TP	CO OUT-9	F1059	1-4-CO OUT-9
NCE	CO OUT- 10	Unused	Unused	NCE25xx	MS/TP	CO OUT-10	Unused	1-4-CO OUT-10
NCE	CO OUT- 11	Unused	Unused	NCE25xx	MS/TP	CO OUT-11	Unused	1-4-CO OUT-11
NCE	AO OUT- 12	ZN1Fan-O	Zone 1 Fan Output	NCE25xx	MS/TP	AO OUT-12	F1059	1-4-AO OUT-12
NCE	AO OUT- 13	ZN2Fan-O	Zone 2 Fan Output	NCE25xx	MS/TP	AO OUT-13	F1059	1-4-AO OUT-13
NCE	AO OUT- 14	ZN3Fan-O	Zone 3 Fan Output	NCE25xx	MS/TP	AO OUT-14	F1059	1-4-AO OUT-14
NCE	AO OUT- 15	ZN4Fan-O	Zone 4 Fan Output	NCE25xx	MS/TP	AO OUT-15	F1059	1-4-AO OUT-15
IOM1	UI IN-1	CHW-F	Chill Water Flow	IOM 4710	SA Bus	UI IN-1	F119	4-1-4-UI IN-1
IOM1	UI IN-2	CHWE-T	Chilled Water Entering Temperature	IOM 4710	SA Bus	UI IN-2	F131	4-1-4-UI IN-2
IOM1	UI IN-3	CHWL-T	Chilled Water Leaving Temperature	IOM 4710	SA Bus	UI IN-3	F131	4-1-4-UI IN-3

IOM1	UI IN-4	FanBank1-I	Fan Bank 1 Current	IOM 4710	SA Bus	UI IN-4	M12	4-1-4-UI IN-4
IOM1	UI IN-5	FanBank18-I	Fan Bank 18 Current	IOM 4710	SA Bus	UI IN-5	F106	4-1-4-UI IN-5
IOM1	UI IN-6	FanBank2-I	Fan Bank 2 Current	IOM 4710	SA Bus	UI IN-6	F106	4-1-4-UI IN-6
IOM1	BI IN-7	FloorWD2-A	Flow Water Detector Alarm	IOM 4710	SA Bus	BI IN-7	F301	4-1-4-BI IN-7
IOM1	BI IN-8	Unused	Unused	IOM 4710	SA Bus	BI IN-8	Unused	4-1-4-BI IN-8
IOM1	BO OUT-1	Unused	Unused	IOM 4710	SA Bus	BO OUT-1	Unused	4-1-4-BO OUT-1
IOM1	BO OUT-2	Unused	Unused	IOM 4710	SA Bus	BO OUT-2	Unused	4-1-4-BO OUT-2
IOM1	BO OUT-3	Unused	Unused	IOM 4710	SA Bus	BO OUT-3	Unused	4-1-4-BO OUT-3
IOM1	CO OUT-4	Unused	Unused	IOM 4710	SA Bus	CO OUT-4	Unused	4-1-4-CO OUT-4
IOM1	CO OUT-5	Unused	Unused	IOM 4710	SA Bus	CO OUT-5	Unused	4-1-4-CO OUT-5
IOM1	CO OUT-6	Unused	Unused	IOM 4710	SA Bus	CO OUT-6	Unused	4-1-4-CO OUT-6
IOM1	CO OUT-7	Unused	Unused	IOM 4710	SA Bus	CO OUT-7	Unused	4-1-4-CO OUT-7
IOM1	AO OUT-8	Unused	Unused	IOM 4710	SA Bus	AO OUT-8	Unused	4-1-4-AO OUT-8
IOM1	AO OUT-9	Unused	Unused	IOM 4710	SA Bus	AO OUT-9	Unused	4-1-4-AO OUT-9
IOM2	UI IN-1	FanBank3-I	Fan Bank 3 Current	IOM 4710	SA Bus	UI IN-1	F106	4-1-5-UI IN-1
IOM2	UI IN-2	FanBank5-I	Fan Bank 5 Current	IOM 4710	SA Bus	UI IN-2	F106	4-1-5-UI IN-2
IOM2	UI IN-3	FanBank4-I	Fan Bank 4 Current	IOM 4710	SA Bus	UI IN-3	F106	4-1-5-UI IN-3
IOM2	UI IN-4	FanBank6-I	Fan Bank 6 Current	IOM 4710	SA Bus	UI IN-4	F106	4-1-5-UI IN-4
IOM2	UI IN-5	FanBank7-I	Fan Bank 7 Current	IOM 4710	SA Bus	UI IN-5	F106	4-1-5-UI IN-5
IOM2	UI IN-6	FanBank8-I	Fan Bank 8 Current	IOM 4710	SA Bus	UI IN-6	F106	4-1-5-UI IN-6
IOM2	BI IN-7	House Power	House Power Status	IOM 4710	SA Bus	BI IN-7	Unused	4-1-5-BI IN-7
IOM2	BI IN-8	Land Power	Land Power Status	IOM 4710	SA Bus	BI IN-8	Unused	4-1-5-BI IN-8

IOM2	BO OUT-1	Unused	Unused	IOM 4710	SA Bus	BO OUT-1	Unused	4-1-5-BO OUT-1
IOM2	BO OUT-2	Unused	Unused	IOM 4710	SA Bus	BO OUT-2	Unused	4-1-5-BO OUT-2
IOM2	BO OUT-3	Unused	Unused	IOM 4710	SA Bus	BO OUT-3	Unused	4-1-5-BO OUT-3
IOM2	CO OUT-4	Unused	Unused	IOM 4710	SA Bus	CO OUT-4	Unused	4-1-5-CO OUT-4
IOM2	CO OUT-5	Unused	Unused	IOM 4710	SA Bus	CO OUT-5	Unused	4-1-5-CO OUT-5
IOM2	CO OUT-6	Unused	Unused	IOM 4710	SA Bus	CO OUT-6	Unused	4-1-5-CO OUT-6
IOM2	CO OUT-7	Unused	Unused	IOM 4710	SA Bus	CO OUT-7	Unused	4-1-5-CO OUT-7
IOM2	AO OUT-8	Unused	Unused	IOM 4710	SA Bus	AO OUT-8	Unused	4-1-5-AO OUT-8
IOM2	AO OUT-9	Unused	Unused	IOM 4710	SA Bus	AO OUT-9	Unused	4-1-5-AO OUT-9
IOM3	UI IN-1	HA1-T	Hot Aisle Zone 1 Temperature	IOM 4710	SA Bus	UI IN-1	F131	4-1-6-UI IN-1
IOM3	UI IN-2	HA2-T	Hot Aisle Zone 2 Temperature	IOM 4710	SA Bus	UI IN-2	F131	4-1-6-UI IN-2
IOM3	UI IN-3	HA3-T	Hot Aisle Zone 3 Temperature	IOM 4710	SA Bus	UI IN-3	F131	4-1-6-UI IN-3
IOM3	UI IN-4	HA4-T	Hot Aisle Zone 4 Temperature	IOM 4710	SA Bus	UI IN-4	F131	4-1-6-UI IN-4
IOM3	UI IN-5	HA5-T	Hot Aisle Zone 5 Temperature	IOM 4710	SA Bus	UI IN-5	F131	4-1-6-UI IN-5
IOM3	UI IN-6	HA6-T	Hot Aisle Zone 6 Temperature	IOM 4710	SA Bus	UI IN-6	F131	4-1-6-UI IN-6
IOM3	BI IN-7	Unused	Unused	IOM 4710	SA Bus	BI IN-7	Unused	4-1-6-BI IN-7
IOM3	BI IN-8	Unused	Unused	IOM 4710	SA Bus	BI IN-8	Unused	4-1-6-BI IN-8
IOM3	BO OUT-1	Unused	Unused	IOM 4710	SA Bus	BO OUT-1	Unused	4-1-6-BO OUT-1
IOM3	BO OUT-2	Unused	Unused	IOM 4710	SA Bus	BO OUT-2	Unused	4-1-6-BO OUT-2
IOM3	BO OUT-3	Unused	Unused	IOM 4710	SA Bus	BO OUT-3	Unused	4-1-6-BO OUT-3
IOM3	CO OUT-4	Unused	Unused	IOM 4710	SA Bus	CO OUT-4	Unused	4-1-6-CO OUT-4
IOM3	CO OUT-5	Unused	Unused	IOM 4710	SA Bus	CO OUT-5	Unused	4-1-6-CO OUT-5

IOM3	CO OUT-6	Unused	Unused	IOM 4710	SA Bus	CO OUT-6	Unused	4-1-6-CO OUT-6
IOM3	CO OUT-7	Unused	Unused	IOM 4710	SA Bus	CO OUT-7	Unused	4-1-6-CO OUT-7
IOM3	AO OUT-8	Unused	Unused	IOM 4710	SA Bus	AO OUT-8	Unused	4-1-6-AO OUT-8
IOM3	AO OUT-9	Unused	Unused	IOM 4710	SA Bus	AO OUT-9	Unused	4-1-6-AO OUT-9
IOM4	UI IN-1	FanBank1 3-I	Fan Bank 13 Current	IOM 4710	SA Bus	UI IN-1	F106	4-1-7-UI IN-1
IOM4	UI IN-2	FanBank1 4-I	Fan Bank 14 Current	IOM 4710	SA Bus	UI IN-2	F106	4-1-7-UI IN-2
IOM4	UI IN-3	FanBank1 5-I	Fan Bank 15 Current	IOM 4710	SA Bus	UI IN-3	F106	4-1-7-UI IN-3
IOM4	UI IN-4	FanBank1 6-I	Fan Bank 16 Current	IOM 4710	SA Bus	UI IN-4	F106	4-1-7-UI IN-4
IOM4	UI IN-5	FanBank1 7-I	Fan Bank 17 Current	IOM 4710	SA Bus	UI IN-5	F106	4-1-7-UI IN-5
IOM4	UI IN-6	FILT3-DP	Filter Differential Pressure	IOM 4710	SA Bus	UI IN-6	F106	4-1-7-UI IN-6
IOM4	BI IN-7	Unused	Unused	IOM 4710	SA Bus	BI IN-7	Unused	4-1-7-BI IN-7
IOM4	BI IN-8	Unused	Unused	IOM 4710	SA Bus	BI IN-8	Unused	4-1-7-BI IN-8
IOM4	BO OUT-1	Unused	Unused	IOM 4710	SA Bus	BO OUT-1	Unused	4-1-7-BO OUT-1
IOM4	BO OUT-2	Unused	Unused	IOM 4710	SA Bus	BO OUT-2	Unused	4-1-7-BO OUT-2
IOM4	BO OUT-3	Unused	Unused	IOM 4710	SA Bus	BO OUT-3	Unused	4-1-7-BO OUT-3
IOM4	CO OUT-4	Unused	Unused	IOM 4710	SA Bus	CO OUT-4	Unused	4-1-7-CO OUT-4
IOM4	CO OUT-5	Unused	Unused	IOM 4710	SA Bus	CO OUT-5	Unused	4-1-7-CO OUT-5
IOM4	CO OUT-6	Unused	Unused	IOM 4710	SA Bus	CO OUT-6	Unused	4-1-7-CO OUT-6
IOM4	CO OUT-7	Unused	Unused	IOM 4710	SA Bus	CO OUT-7	Unused	4-1-7-CO OUT-7
IOM4	AO OUT-8	Unused	Unused	IOM 4710	SA Bus	AO OUT-8	Unused	4-1-7-AO OUT-8
IOM4	AO OUT-9	Unused	Unused	IOM 4710	SA Bus	AO OUT-9	Unused	4-1-7-AO OUT-9

IOM5	UI IN-1	ZN5-DP	Zone 5 Differential Pressure	IOM 4710	SA Bus	UI IN-1	F106	4-1-8-UI IN-1
IOM5	UI IN-2	ZN6-DP	Zone 6 Differential Pressure	IOM 4710	SA Bus	UI IN-2	F106	4-1-8-UI IN-2
IOM5	UI IN-3	FanBank9-I	Fan Bank 9 Current	IOM 4710	SA Bus	UI IN-3	F106	4-1-8-UI IN-3
IOM5	UI IN-4	FanBank10-I	Fan Bank 10 Current	IOM 4710	SA Bus	UI IN-4	F106	4-1-8-UI IN-4
IOM5	UI IN-5	FanBank11-I	Fan Bank 11 Current	IOM 4710	SA Bus	UI IN-5	F106	4-1-8-UI IN-5
IOM5	UI IN-6	FanBank12-I	Fan Bank 12 Current	IOM 4710	SA Bus	UI IN-6	F106	4-1-8-UI IN-6
IOM5	BI IN-7	Unused	Unused	IOM 4710	SA Bus	BI IN-7	Unused	4-1-8-BI IN-7
IOM5	BI IN-8	Unused	Unused	IOM 4710	SA Bus	BI IN-8	Unused	4-1-8-BI IN-8
IOM5	BO OUT-1	Unused	Unused	IOM 4710	SA Bus	BO OUT-1	Unused	4-1-8-BO OUT-1
IOM5	BO OUT-2	Unused	Unused	IOM 4710	SA Bus	BO OUT-2	Unused	4-1-8-BO OUT-2
IOM5	BO OUT-3	Unused	Unused	IOM 4710	SA Bus	BO OUT-3	Unused	4-1-8-BO OUT-3
IOM5	CO OUT-4	Unused	Unused	IOM 4710	SA Bus	CO OUT-4	Unused	4-1-8-CO OUT-4
IOM5	CO OUT-5	Unused	Unused	IOM 4710	SA Bus	CO OUT-5	Unused	4-1-8-CO OUT-5
IOM5	CO OUT-6	Unused	Unused	IOM 4710	SA Bus	CO OUT-6	Unused	4-1-8-CO OUT-6
IOM5	CO OUT-7	Unused	Unused	IOM 4710	SA Bus	CO OUT-7	Unused	4-1-8-CO OUT-7
IOM5	AO OUT-8	Unused	Unused	IOM 4710	SA Bus	AO OUT-8	Unused	4-1-8-AO OUT-8
IOM5	AO OUT-9	Unused	Unused	IOM 4710	SA Bus	AO OUT-9	Unused	4-1-8-AO OUT-9
IOM6	UI IN-1	FILT6-DP	Filter Differential Pressure	IOM 4710	SA Bus	UI IN-1	F106	4-1-9-UI IN-1
IOM6	UI IN-2	FILT2-DP	Filter Differential Pressure	IOM 4710	SA Bus	UI IN-2	F106	4-1-9-UI IN-2
IOM6	UI IN-3	FILT4-DP	Filter Differential Pressure	IOM 4710	SA Bus	UI IN-3	F106	4-1-9-UI IN-3
IOM6	UI IN-4	FILT1-DP	Filter Differential Pressure	IOM 4710	SA Bus	UI IN-4	F106	4-1-9-UI IN-4
IOM6	UI IN-5	FILT5-DP	Filter Differential Pressure	IOM 4710	SA Bus	UI IN-5	F106	4-1-9-UI IN-5

IOM6	UI IN-6	Unused	Unused	IOM 4710	SA Bus	UI IN-6	Unused	4-1-9-UI IN-6
IOM6	BI IN-7	Unused	Unused	IOM 4710	SA Bus	BI IN-7	Unused	4-1-9-BI IN-7
IOM6	BI IN-8	Unused	Unused	IOM 4710	SA Bus	BI IN-8	Unused	4-1-9-BI IN-8
IOM6	BO OUT-1	Unused	Unused	IOM 4710	SA Bus	BO OUT-1	Unused	4-1-9-BO OUT-1
IOM6	BO OUT-2	Unused	Unused	IOM 4710	SA Bus	BO OUT-2	Unused	4-1-9-BO OUT-2
IOM6	BO OUT-3	Unused	Unused	IOM 4710	SA Bus	BO OUT-3	Unused	4-1-9-BO OUT-3
IOM6	CO OUT-4	Unused	Unused	IOM 4710	SA Bus	CO OUT-4	Unused	4-1-9-CO OUT-4
IOM6	CO OUT-5	Unused	Unused	IOM 4710	SA Bus	CO OUT-5	Unused	4-1-9-CO OUT-5
IOM6	CO OUT-6	Unused	Unused	IOM 4710	SA Bus	CO OUT-6	Unused	4-1-9-CO OUT-6
IOM6	CO OUT-7	Unused	Unused	IOM 4710	SA Bus	CO OUT-7	Unused	4-1-9-CO OUT-7
IOM6	AO OUT-8	Unused	Unused	IOM 4710	SA Bus	AO OUT-8	Unused	4-1-9-AO OUT-8
IOM6	AO OUT-9	Unused	Unused	IOM 4710	SA Bus	AO OUT-9	Unused	4-1-9-AO OUT-9

Regulatory compliance notices

Regulatory compliance identification numbers

For the purpose of regulatory compliance certifications and identification, this product has been assigned a unique regulatory model number. The regulatory model number can be found on the product nameplate label, along with all required approval markings and information. When requesting compliance information for this product, always refer to this regulatory model number. The regulatory model number is not the marketing name or model number of the product.

Federal Communications Commission notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

Canadian notice

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union regulatory notice

This product complies with the following EU Directives:

- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC
- Machinery Directive 98/37/EEC

Compliance with these directives implies conformity to applicable harmonized European standards (European Norms) which are listed on the EU Declaration of Conformity issued by Hewlett-Packard for this product or product family.

This compliance is indicated by the following conformity marking placed on the product:



This marking is valid for non-Telecom products and EU harmonized Telecom products (e.g. Bluetooth).



This marking is valid for EU non-harmonized Telecom products.

*Notified body number (used only if applicable—refer to the product label)

Hewlett-Packard GmbH, HQ-TRE, Herrenberger Strasse 140, 71034 Boeblingen, Germany

Disposal of waste equipment by users in private households in the European Union



This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

BSMI notice

警告使用者:

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Chinese notice

Class A equipment

声明
此为 A 级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对干扰采取可行的措施。

Korean class A notice

A급 기기 (업무용 방송통신기기)	이 기기는 업무용(A급)으로 전자파적합등록을 한 기기이오니 판매사 또는 사용자는 이 점을 주의하시기 바라며, 가정 외의 지역에서 사용하는 것을 목적으로 합니다.
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Japanese class A notice

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に
基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波
妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ず
るよう要求されることがあります。

Acronyms and abbreviations

AHJ

Authority Having Jurisdiction

ASHRAE

American Society of Heating, Refrigerating and Air-Conditioning Engineers

ASSD

air sampling smoke detector

BMS

building management system

BPMS

branch power monitor system

EPMS

electrical power monitor system

EPO

emergency power off

FAQ

frequently asked questions

FC

fan control

HEX

heat exchanger

ISO

International Organization for Standardization

NEMA

National Electrical Manufacturers Association

PDU

power distribution unit

POD

Performance-Optimized Datacenter

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