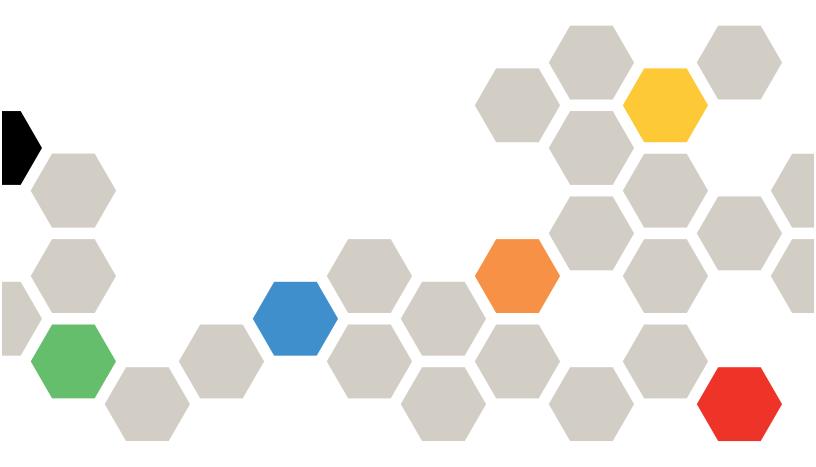
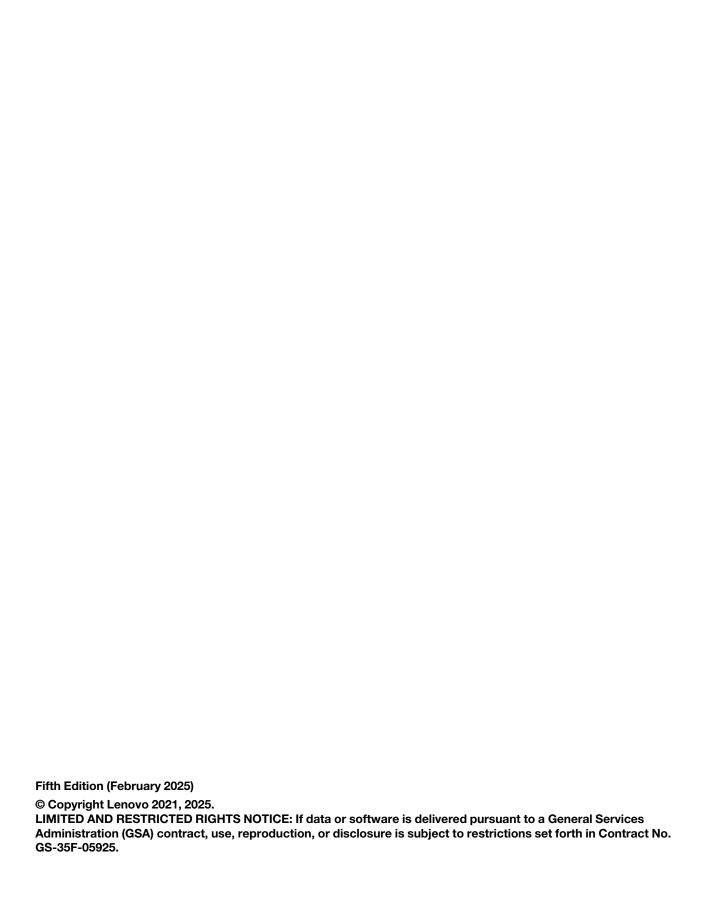
Lenovo

ThinkSystem Rear Door Heat eXchanger V2 User Guide



Machine Type: 1756



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Safety

Before installing this product, read the Safety Information.

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前,请仔细阅读 Safety Information (安全信息)。

安裝本產品之前,請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

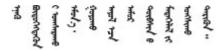
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.



Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

Youq mwngz yungh canjbinj neix gaxgonq, itdingh aeu doeg aen canjbinj soengq cungj vahgangj ancien siusik.

Safety inspection checklist

Use the information in this section to identify potentially unsafe conditions with your server. As each machine was designed and built, required safety items were installed to protect users and service technicians from injury.

Note: The product is not suitable for use at visual display workplaces according to §2 of the Workplace Regulations.

Note: The set-up of the server is made in the server room only.

CAUTION:

This equipment must be installed or serviced by trained personnel, as defined by the IEC 62368-1, the standard for Safety of Electronic Equipment within the Field of Audio/Video, Information Technology and Communication Technology. Lenovo assumes you are qualified in the servicing of equipment and trained in recognizing hazards energy levels in products. Access to the equipment is by the use of a tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.

Important: Electrical grounding of the server is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Use the following checklist to verify that there are no potentially unsafe conditions:

- 1. Make sure that the power is off and the power cord is disconnected.
- 2. Check the power cord.
 - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
 - Make sure that the power cord is the correct type.

To view the power cords that are available for the server:

a. Go to:

http://dcsc.lenovo.com/#/

- b. Click Preconfigured Model or Configure to order.
- c. Enter the machine type and model for your server to display the configurator page.
- d. Click **Power → Power Cables** to see all line cords.
- Make sure that the insulation is not frayed or worn.
- 3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
- 4. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
- 5. Check for worn, frayed, or pinched cables.
- 6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

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Chapter 1. Rear Door Heat eXchanger V2

See this topic to learn about parts of ThinkSystem Rear Door Heat eXchanger V2.

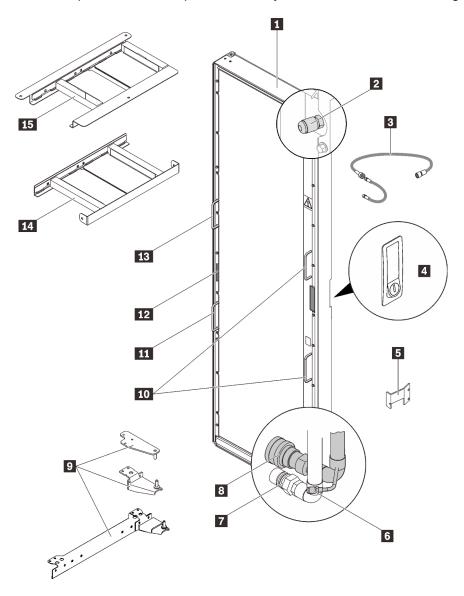


Figure 1. ThinkSystem Rear Door Heat eXchanger V2 components

Table 1. Rear Door Heat eXchanger components

Rear Door Heat eXchanger assembly	9 Hinge kit
2 Air-purging valve	10 Lift handles
■ Air-purging tool	11 Lift handle
4 Door latch	12 Serial number
1 Latch plate	13 Lift handle
6 Drain valve	14 Lower air baffle

Table 1. Rear Door Heat eXchanger components (continued)

Return manifold coupling	15 Upper air baffle
■ Supply manifold coupling	

Rear Door Heat eXchanger V2 specifications

Dimension Weight	 Depth: 129 mm / 5.0 inches Height: 1950 mm / 76.8 inch Width: 600 mm / 23.6 inch Empty: 39 kg / 121 lbs
Air movement	Provided by servers and other devices in the rack
Air temperature drop	With high-heat-load devices, up to 25°C (45°F) between the air exiting the rack devices and the air exiting the heat exchanger.
Water	 Source User-supplied, compliant with specifications in this document Pressure – Normal operation: <137.93 kPa (20 psi) – Maximum: 689.66 kPa (100 psi) Volume Approximately 9 liters (2.4 gallons) Temperature – Above dew point – 18°C ±1°C (64.4°F ±1.8°F) for ASHRAE Class 1 Environment – 22°C ±1°C (71.6°F ±1.8°F) for ASHRAE Class 2 Environment Note: See "Heat exchanger performance" for more information. Required water flow rate (as measured at the supply entrance to the heat exchanger) – Minimum: 22.7 liters (6 gallons) per minute – Maximum: 56.8 liters (15 gallons) per minute

For setup and installation, see Chapter 2 "Set up Rear Door Heat eXchanger V2" on page 5.

Heat exchanger performance

Expected performance of the heat exchanger is illustrated in the following figure for a typical inlet air temperature of 27°C (80.6°F), with a fully populated rack, near uniform power dissipation, and a 30-40 kW heat load. By selecting the correct water inlet temperature and water flow rate, you can achieve the necessary heat removal. A heat removal of 100% indicates that an amount of heat equivalent to that generated by the devices has been removed by the heat exchanger and the average air temperature leaving the heat exchanger is identical to that entering the rack (27°C /80.6°F in this example). Heat removal in excess of 100% indicates that the heat exchanger not only removed all of the heat generated by the devices but further cooled the air so that the average air temperature leaving the rack is actually lower than that entering the rack.

% heat removal as function of water temperature and flow rate for given rack power, rack inlet temperature, and rack air flow rate

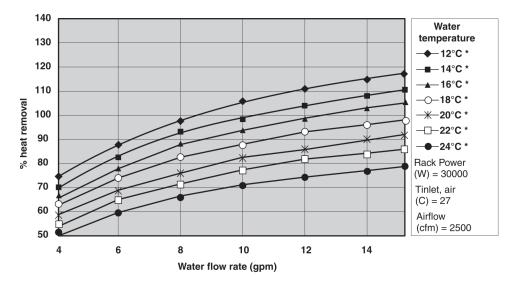


Figure 2. Typical performance of the heat exchanger, 30 kW heat load

As described in "Water specifications for the secondary cooling loop" on page 17, a given water temperature may be used only if the system that is supplying the water is able to measure the room dew point and automatically adjust the water temperature accordingly. Otherwise, the water temperature must be above the maximum dew point that is allowed at that data center installation.

Performance data is shown in the following figure for a 20 kW heat load. Because of the lower heat load, a specific level of cooling can be achieved with warmer water, a lower flow rate, or both.

140 Water temperature 130 -12°C * 120 16°C * 110 -O-18°C * % heat removal 100 **₩**-20°C * -□-22°C * 90 ●-24°C * Rack Power 80 (W) = 2000070 Tinlet, air (C) = 2760 Airflow (cfm) = 200050 14 4 6 10 12

% heat removal as function of water temperature and flow rate for given rack power, rack inlet temperature, and rack air flow rate

Figure 3. Typical performance of the heat exchanger, 20 kW heat load

Water flow rate (gpm)

Chapter 2. Set up Rear Door Heat eXchanger V2

See this topic to learn how to install and set up ThinkSystem Rear Door Heat eXchanger V2.

About this task

Follow the instructions in the section corresponding to the installation scenario:

- If Rear Door Heat eXchanger V2 comes when installed to the rack, see "Complete setup of Rear Door Heat eXchanger V2 that comes with the rack" on page 6 to complete the setup procedure.
- To replace a regular rear door with Rear Door Heat eXchanger V2, see "Replace a regular door with Rear Door Heat eXchanger V2" on page 8.

Important: Make sure to plan the cooling system with consideration of "Water specifications for the secondary cooling loop" on page 17.

S010



CAUTION:

Do not place any object weighing more than 82 kg (180 lb) on top of rack-mounted devices.

S019



CAUTION:

The power-control button on the device does not turn off the electrical current supplied to the device. The device also might have more than one connection to dc power. To remove all electrical current from the device, ensure that all connections to dc power are disconnected at the dc power input terminals.

R007



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- Connect power cords from devices in the rack cabinet to electrical outlets that are near the rack cabinet and are easily accessible.
- Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet before you service any device in the rack cabinet.
- Install an emergency-power-off switch if more than one power device (power distribution unit or uninterruptible power supply) is installed in the same rack cabinet.
- Connect all devices that are installed in a rack cabinet to power devices that are installed in the same rack cabinet. Do not connect a power cord from a device that is installed in one rack cabinet to a power device that is installed in a different rack cabinet.

R004



CAUTION

See the instructions in the rack documentation before you install devices, remove devices, or relocate the rack.

S038



CAUTION:

Eye protection should be worn for this procedure.

Complete setup of Rear Door Heat eXchanger V2 that comes with the rack

See this topic to learn how to complete setup of ThinkSystem Rear Door Heat eXchanger V2 when it comes already installed to the rack.

Procedure

Step 1. Remove the brackets that support the rear door heat exchanger.

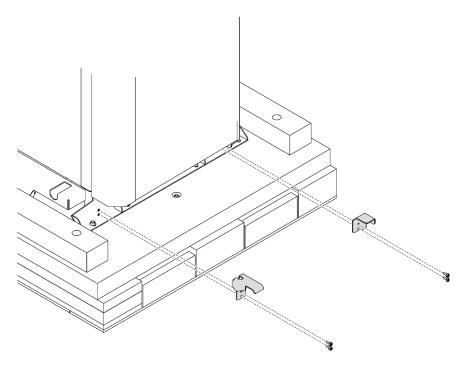


Figure 4. Removing the supporting brackets

Step 2. Make sure that one specially trained person holds onto the rear door heat exchanger and guides the rack down the ramp. The other specially trained persons must guide the rack down the ramp by holding onto the rack frame. Slowly roll the rack down the ramp until the casters are on the floor. Move the rack to the final location.

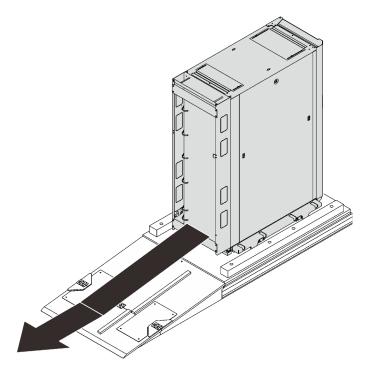


Figure 5. Moving the rack cabinet from the pallet

After this task is completed

Replace a regular door with Rear Door Heat eXchanger V2

See this topic to learn how to replace a regular rear door with ThinkSystem Rear Door Heat eXchanger V2.

Procedure

Step 1. Extend each of the four leveling pads in turns until they firmly contact the floor and support the rack cabinet. Make sure the cabinet is balanced by gently pushing the cabinet. If it tilts, adjust the length of the leveling pads until the cabinet is well balanced.

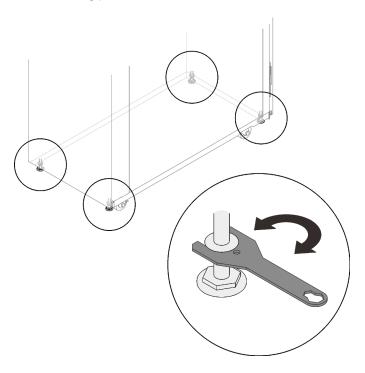


Figure 6. Lowering the leveling pads

Step 2. Remove the rear door from the rack cabinet.

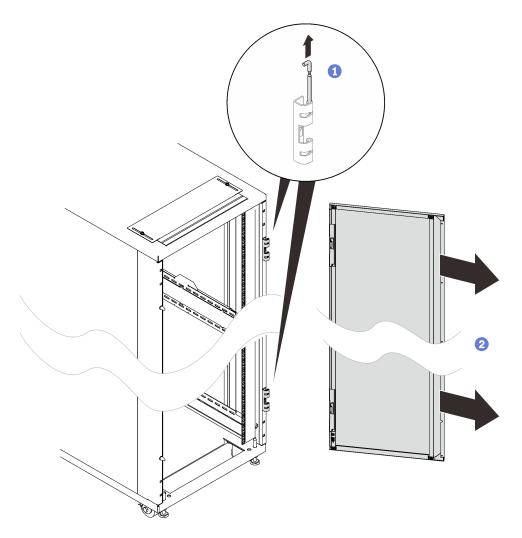


Figure 7. Removing a door

Step 3. Remove the two door hinges and the two doorstops.

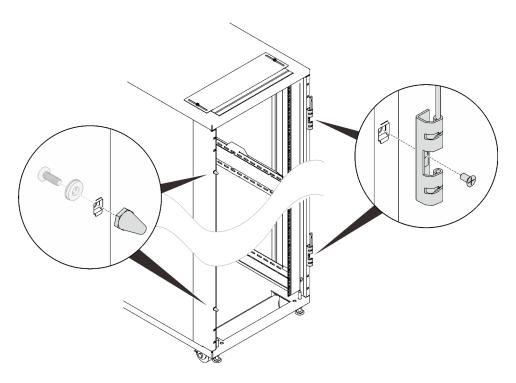


Figure 8. Removing the door hinges and doorstops

Step 4. Remove the door latch.

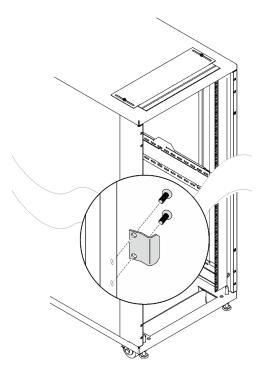


Figure 9. Removing the door latch

Step 5. Align the holes in the latch plate with those in the two clip nuts; then, secure the latch plate in place with two M6 screws.

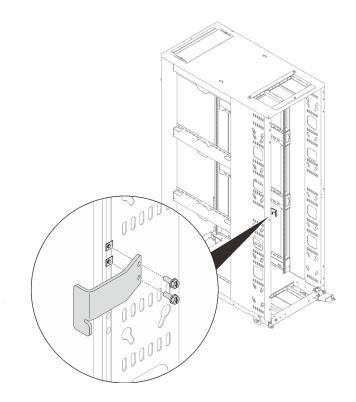


Figure 10. Installing the latch plate

Step 6. Install the upper air baffle.

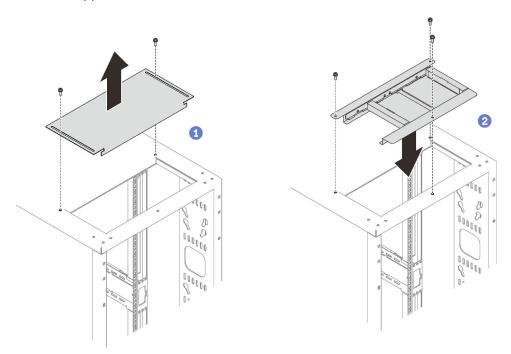


Figure 11. Installing the upper air baffle

- 1 Remove the two screws that secure the rear cable access cover, and remove the cover.
- 2 Align the upper air baffle with the slot, and secure it with three screws.

Remove the four screws that secure the cable access bar, and remove the bar.

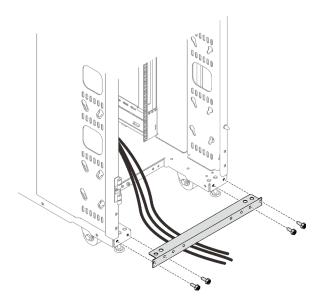


Figure 12. Removing the cable access bar

Step 8. Align the lower air baffle to the bottom cable slot, and secure it with four screws as illustrated.

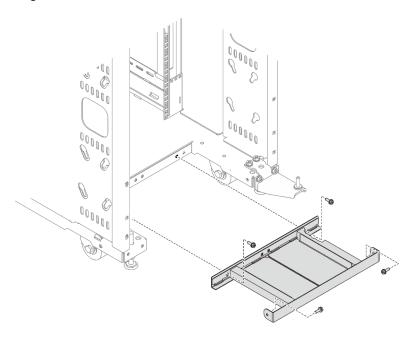


Figure 13. Installing the lower air baffle

Step 9. Secure the bottom hinge assembly to the rack cabinet with eight screws.

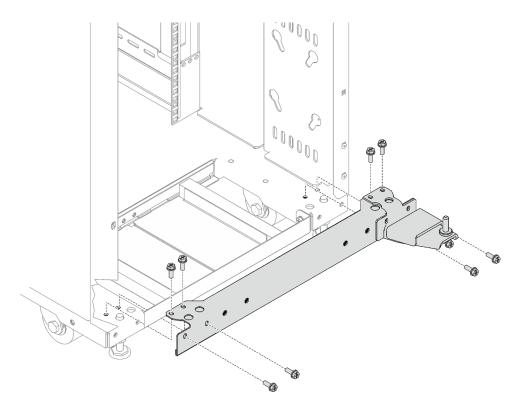
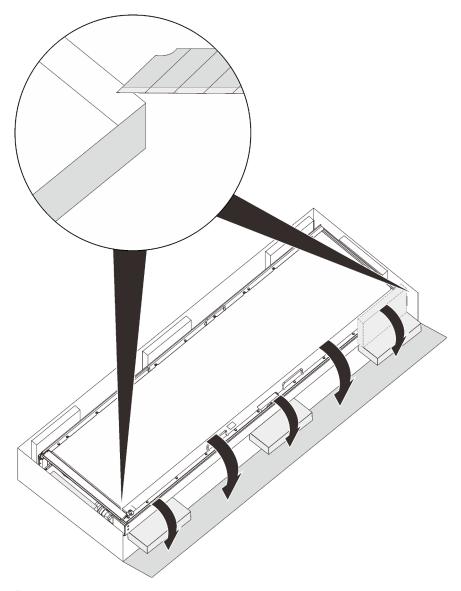


Figure 14. Installing the bottom hinge assembly

Step 10. Face the bottom side of the carton, remove the carton top, and slit the two carton corners on your right-hand side with a knife. Then, fold the right carton panel down to the ground, and rotate the threes carton inserts down.



Bottom

Figure 15. Unpacking the heat exchanger

Step 11. With three people, rotate the heat exchanger to vertical on the three carton inserts. Then, remove the inner and outer hose access panels while one person hold the heat exchanger.

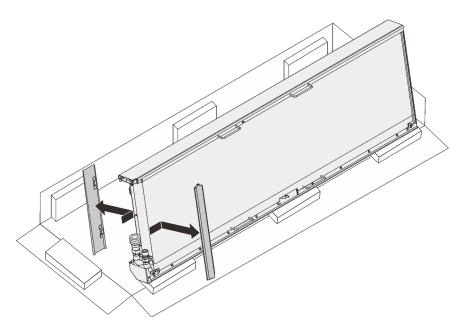


Figure 16. Removing the hose access panels

Step 12. Hold the heat exchanger with three people on the handles/spots as illustrated. Then, carefully lift the heat exchanger and turn it upright.

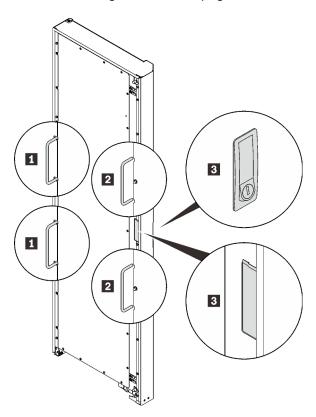
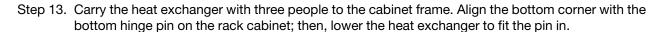


Figure 17. Lifting the heat exchanger with three people

1 Handles that the first person hold on to	Spots that the third person hold on to
2 Handles that the second person hold on to	



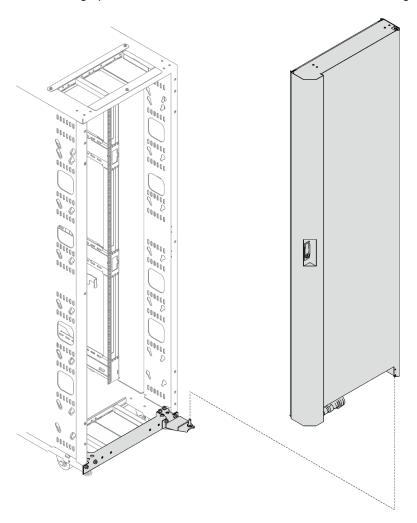


Figure 18. Installing the heat exchanger to the rack cabinet

Step 14. Hold the heat exchanger in place with two people. Insert the top hinge pin to the heat exchanger; then, secure the hinge with three screws.

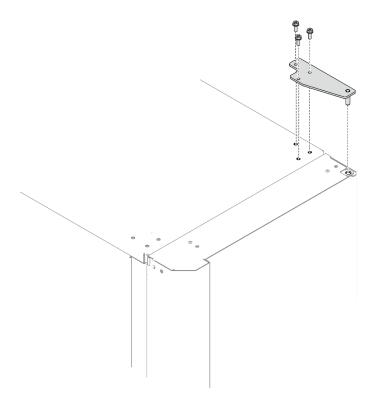


Figure 19. Installing the top hinge

After this task is completed

Proceed to "Fill the heat exchanger with water" on page 27.

Water specifications for the secondary cooling loop

It is of crucial importance that water supplied to the heat exchanger meet the requirements listed in this topic. Make sure to meet the requirements before setting up liquid cooling system.

Important: Without the water that is being supplied to the heat exchanger meeting the requirements that are described in this topic, system failures might occur as a result of any of the following problems:

- Leaks due to corrosion and pitting of the metal components of the heat exchanger or the water-supply system.
- Buildup of scale deposits inside the heat exchanger, which can cause the following problems:
 - A reduction of the ability of the heat exchanger to cool the air that is exhausted from the rack
 - Failure of mechanical hardware, such as a hose guick-connect coupling
- Organic contamination, such as bacteria, fungi, or algae. This contamination can cause the same problems as described for scale deposits.

Control and conditioning of the secondary cooling loop

The water that is used to fill, refill, and supply the heat exchanger must be particle-free deionized water or particle-free distilled water with appropriate controls for avoiding the following issues:

- Metal corrosion
- Bacterial fouling

Scaling

The water cannot originate from the primary chilled-water system for the building, but must be supplied as part of a secondary closed-loop system.

Important: Do not use glycol solutions, because they can adversely affect the cooling performance of the heat exchanger.

Materials to use in secondary loops

Use any of the following materials in supply lines, connectors, manifolds, pumps and any other hardware that makes up the closed-loop water-supply system:

- Copper
- Brass with less than 30% zinc content.
- Stainless steel 303 or 316
- Peroxide-cured ethylene propylene diene monomer (EPDM) rubber, non-metal-oxide material

Materials to avoid in secondary loops

Do not use any of the following materials in any part of the water-supply system:

- Oxidizing biocides, such as chlorine, bromine, and chlorine dioxide
- Aluminum
- Brass with greater than 30% zinc
- Irons (non-stainless steel)

Water-supply requirements for secondary loops

This section includes specific characteristics of the system that supplies the chilled conditioned water to the heat exchanger.

Temperature:

The heat exchanger and its supply hose and return hoses are not insulated. Avoid any condition that might cause condensation. The temperature of the water inside the supply hose, return hose, and heat exchanger must be kept above the dew point of the location where the heat exchanger is being used.

Attention: Typical primary chilled water is too cold for use in this application because building chilled water can be as cold as 4°C - 6°C (39°F - 43°F).

Important: The system that supplies the cooling water must be able to measure the room dew point and automatically adjust the water temperature accordingly. Otherwise, the water temperature must be above the maximum dew point for that data center installation. For example, the following minimum water temperature must be maintained:

- 18°C ±1°C (64.4°F ±1.8°F). This is applicable within an ASHRAE Class 1 Environmental Specification that requires a maximum dew point of 17°C (62.6°F).
- 22°C ±1°C (71.6°F ±1.8°F). This is applicable within an ASHRAE Class 2 Environmental Specification that requires a maximum dew point of 21°C (69.8°F).

See the ASHRAE document Thermal Guidelines for Data Processing Environments. Information about obtaining this document is at https://www.techstreet.com/ashrae/products/1909403.

Pressure

The water pressure in the secondary loop must be less than 690 kPa (100 psi). Normal operating pressure at the heat exchanger must be 414 kPa (60 psi) or less.

Flow rate

The flow rate of the water in the system must be in the range of 23 - 57 liters (6 - 15 gallons) per minute. Pressure drop versus flow rate for heat exchangers (including quick-connect couplings) is defined as approximately 103 kPa (15 psi) at 57 liters (15 gallons) per minute.

Water volume limits

The heat exchanger holds approximately 9 liters (2.4 gallons). Fifteen meters (50 ft) of 19 mm (0.75 in.) supply and return hoses hold approximately 9.4 liters (2.5 gallons). To minimize exposure to flooding in the event of leaks, the entire product cooling system (heat exchanger, supply hose, and return hose). excluding any reservoir tank, must have a maximum 18.4 liters (4.8 gallons) of water. This is a cautionary statement, not a functional requirement. Also consider using leak detection methods on the secondary loop that supplies water to the heat exchanger.

Air exposure

The secondary cooling loop is a closed loop, with no continuous exposure to room air. After you fill the loop, remove all air from the loop. An air bleed valve is provided at the top of a heat exchanger manifold for purging all air from the system.

Water delivery specifications for secondary loops

This section includes the various hardware components that make up the delivery system secondary loop that provides the chilled, conditioned water to the heat exchanger. The delivery system includes pipes, hoses, and the required connection hardware to connect the hoses to the heat exchanger. Hose management in raised-floor and non-raised-floor environments is also described.

The heat exchanger can remove 100% or more of the heat load from an individual rack when it is running under optimum conditions.

The primary cooling loop is considered to be the building chilled-water supply or a modular chiller unit. The primary loop must not be used as a direct source of coolant for the heat exchanger.

The main purpose of this topic is to provide examples of typical methods of secondary loop setup and operating characteristics that are needed to provide an adequate, safe supply of water to the heat exchanger.

Attention: The overpressure safety device must meet the following requirements:

- Comply with ISO 4126-1 (Information about obtaining this document is at https://webstore.ansi.org/ Standards/ISO/ISO41262013. Search on document number iso 4126-1.)
- Be installed so that it is easily accessed for inspection, maintenance, and repair.
- Be connected as close as possible to the device that it is intended to protect.
- Be adjustable only with the use of a tool.
- Have a discharge opening that is directed so that discharged water or fluid will not create a hazard or be directed toward any person.
- Be of adequate discharge capacity to ensure that the maximum working pressure is not exceeded.
- Be installed without a shutoff valve between the overpressure safety device and the protected device.

The following figures show typical cooling solutions with the most flexibility possible. Consider the following guidelines before planning your solution.

 A method for monitoring and setting the total flow rate delivered to all of the heat exchangers is required. This can be a discrete flowmeter that is built into the flow loop or a flowmeter within the secondary loop of the coolant distribution unit (CDU).

- · After you set the total flow rate for all of the heat exchangers by using a flowmeter as previously described, it is important to design the plumbing so that it provides the flow rate that you want for each heat exchanger and provides a way to verify the flow rate. Figure 5 on page 16 through Figure 8 on page 19 illustrate the use of circuit setters to adjust the flow rate to each heat exchanger. Other methods, such as inline or external flowmeters, can provide a more accurate method for setting the flow rate through the individual shutoff valves.
- Design the flow loop to minimize the total pressure drop within the flow loop. The Optional Low Impedance Quick Connect feature (shown in Figure 5 on page 16 through Figure 8 on page 19) cannot be the Eaton guick-connect couplings that are used on the heat exchanger because of the excessive pressure drop associated with flowing through four quick-connect pairs in series. These must be very low, near 0, flow impedance quick connects. Alternatively, these quick connects can be eliminated and replaced with a hose barb connection.

Following are some examples of the most common solutions.

Primary and secondary cooling loops

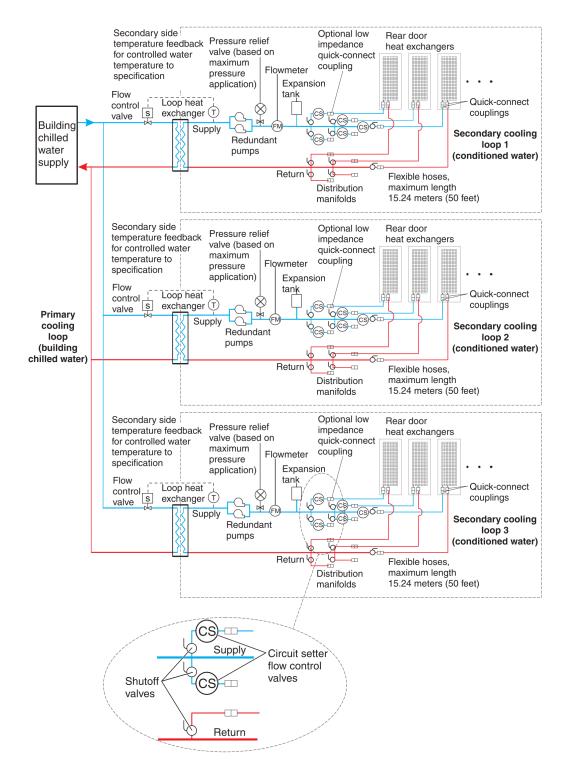


Figure 20. Primary and secondary cooling loops

This figure shows a typical cooling solution and identifies the components of the primary cooling loop and the secondary cooling loop.

Coolant distribution unit with a fabricated facilities solution

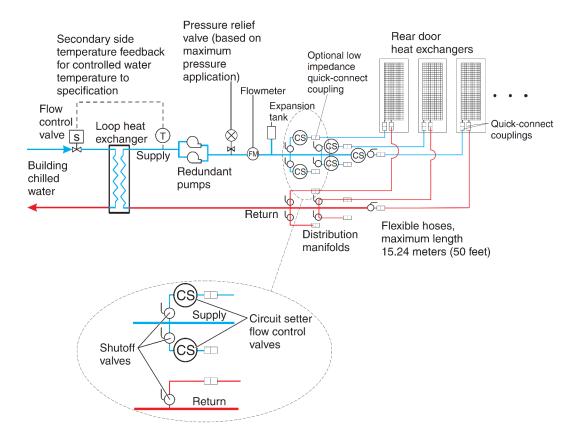


Figure 21. Coolant distribution unit with a fabricated facilities solution

This figure shows an example of a facilities fabricated solution. The actual number of heat exchangers that are connected to a secondary loop depends on the capacity of the coolant distribution unit that is running the secondary loop.

Coolant distribution unit with off-the-shelf supplier solutions

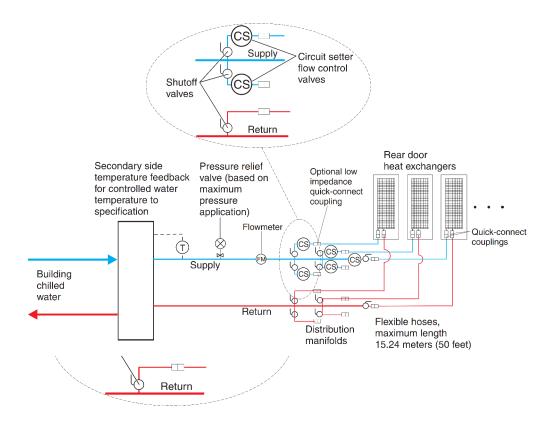


Figure 22. Coolant distribution unit that uses off-the-shelf supplier solutions

Notes: Supplier-built coolant distribution unit (CDU) suggested features:

- Temperature and flow metering (monitoring)
- Leak detection or water level sensing and shutdown
- Local and remote monitoring and control
- Access port for filling and water treatment

This figure shows an example of an off-the-shelf modular coolant distribution unit. The actual number of heat exchangers that are connected to a secondary loop depends on the capacity of the coolant distribution unit that is running the secondary loop

· Coolant distribution unit with a water chiller unit to provide conditioned water

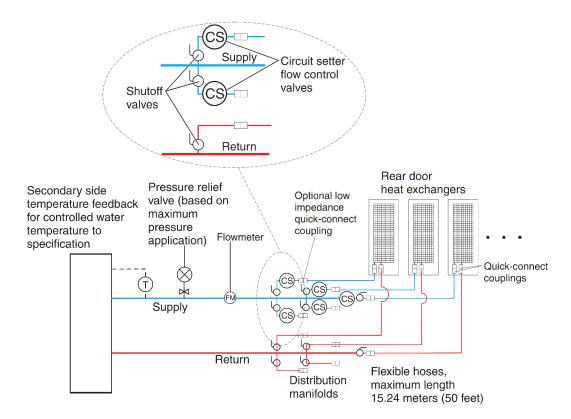


Figure 23. Coolant distribution unit that uses off-the-shelf supplier solutions

Notes: Supplier-built water chiller unit required features:

- Temperature and flow metering (monitoring)
- Leak detection or water level sensing and shutdown
- Local and remote monitoring and control
- Access port for filling and water treatment

This figure shows an example of a water chiller unit that supplies conditioned water to one or more heat exchangers. This must be a closed system (no exposure of the water to air) and meet all materials, water quality, water treatment, and temperature and flow specifications that are defined in this document. A water chiller unit is considered an acceptable alternative to use as a building chilled water source for removing heat from an Rear Door Heat eXchanger.

Manifolds and piping

Manifolds that accept large-diameter feed pipes from a pump unit are the preferred method for splitting the flow of water to smaller-diameter pipes or hoses that are routed to individual heat exchangers. Manifolds must be constructed of materials that are compatible with the pump unit and related piping. The manifolds must provide enough connection points to allow a matching number of supply and return lines to be attached, and the manifolds must match the capacity rating of the pumps and the loop heat exchanger (between the secondary cooling loop and the building chilled-water source). Anchor or restrain all manifolds to provide the required support to avoid movement when quick-connect couplings are connected to the manifolds.

Example manifold supply pipe sizes

• Use a 50.8 mm (2 in.) or larger supply pipe to provide the correct flow to three 19 mm (0.75 in.) supply hoses, with a 100 kW coolant distribution unit (CDU).

- Use a 63.5 mm (2.50 in.) or larger supply pipe to provide the correct flow to four 19 mm (0.75 in.) supply hoses, with a 120 kW CDU.
- Use an 88.9 mm (3.50 in.) or larger supply pipe to provide the correct flow to nine 19 mm (0.75 in.) supply hoses, with a 300 kW CDU.

To stop the flow of water in individual legs of multiple circuit loops, install shutoff valves for each supply and return line. This provides a way to service or replace an individual heat exchanger without affecting the operation of other heat exchangers in the loop.

To ensure that water specifications are being met and that the optimum heat removal is taking place, use temperature and flow metering (monitoring) in secondary loops.

Anchor or restrain all manifolds and pipes to provide the required support and to avoid movement when quick-connect couplings are being attached to the manifolds.

Figure 24 "The following figure" on page 25 shows another layout for multiple water circuits.

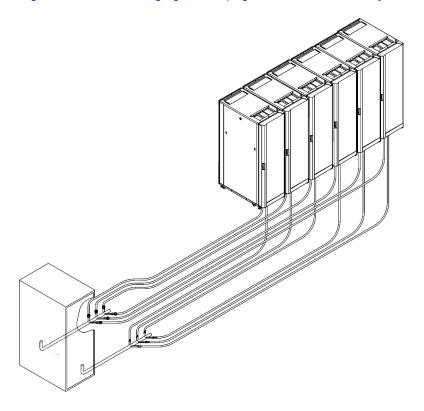


Figure 24. Typical central manifold (at a central location for multiple water circuits)

Figure 25 "The following figure" on page 26 shows an extended manifold layout.

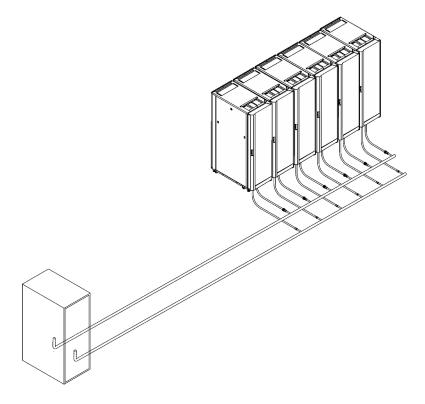


Figure 25. Typical extended manifold (along aisles between racks)

Flexible hoses and connections to manifolds and heat exchangers

Pipe and hose configurations can vary. You can determine the best configuration for your installation by analyzing the needs of your facilities, or a site preparation representative can provide this analysis.

Flexible hoses are needed to supply and return water between your hard plumbing (manifolds and coolant distribution units) and the heat exchanger (allowing needed movement for opening and closing the rack rear door).

Hoses are available that provide water with acceptable pressure-drop characteristics and that help prevent depletion of some corrosion inhibitors. These hoses must be made of peroxide-cured ethylene propylene diene monomer (EPDM) rubber, non-metal oxide material and must have Eaton self-coupling type quick connector ball valve at one end which are attached to the heat exchanger, and must either have a low impedance quick connect coupling or nothing so as to attach to a barb at the other end. The Eaton ball valves that are described in this topic are compatible with the heat exchanger couplings. Hose lengths from 3 to 15 meters (10 to 50 ft), in increments of 3 meters (10 ft), are available. Hoses that are longer than 15 meters (50 ft) might create unacceptable pressure loss in the secondary circuit and reduce the water flow, reducing the heat removal capabilities of the heat exchanger.

Use quick-connect couplings to attach the hoses to the heat exchangers. Hose couplings that connect to the heat exchanger must have the following characteristics:

- The couplings must be constructed of passivated 300-L series stainless steel or brass with less than 30% zinc content. The coupling size is 19 mm (0.75 in.).
- The hoses must have Eaton part number FD83-2046-16-16, or equivalent.
- If a low impedance quick-connect coupling is used at the opposite (manifold) end of the hose, use positive locking mechanisms to prevent loss of water when the hoses are disconnected. The connections must minimize water spill and air inclusion into the system when they are disconnected.

Fill the heat exchanger with water

See this topic to learn how to fill ThinkSystem Rear Door Heat eXchanger V2 with water.

About this task

S038



CAUTION:

Eye protection should be worn for this procedure.

Attention: Wear safety goggles or other eye protection whenever you fill, drain, or purge air or nitrogen from the heat exchanger.

Procedure

Step 1. If the inner hose access panel is installed, lift and remove it from the heat exchanger.

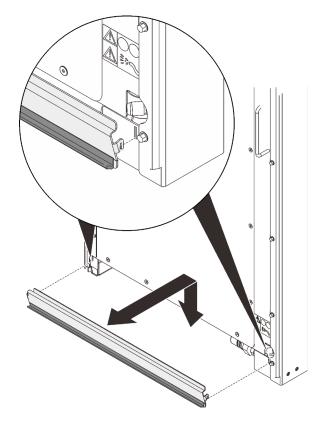


Figure 26. Removing the inner hose access panel

Step 2. If the outer hose access panel is installed, remove the screw that secures the panel (if applicable), then lift and remove the panel from the heat exchanger.

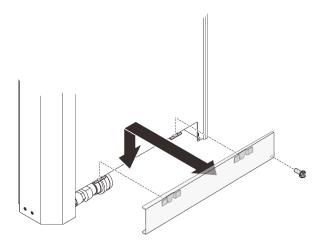


Figure 27. Removing the outer hose access panel

Step 3. Purge the nitrogen that has been filled in the hose from the hose.

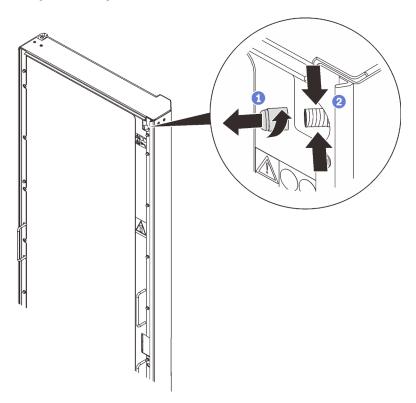


Figure 28. Purging nitrogen

- 1 Loosen and remove the cap from the air-purging valve.
- 2 Press in on the valve stem of the air-purging valve to purge the nitrogen from the heat exchanger. Continue holding in the valve stem until the pressure is released.
- Step 4. Align the supply hose coupling with the supply manifold, push it in and pull the collar backward until it locks in place with an audible click. Then, repeat the same procedure on the return hose and manifold.

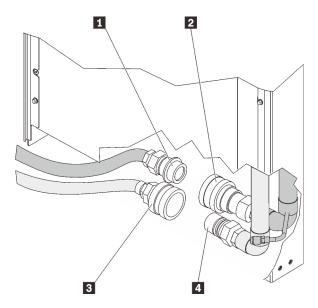


Figure 29. Supply and return hoses and manifold couplings

- Connect the supply hose assembly (11) to the supply manifold-coupling (2).
- Connect the return hose assembly (1) to the return manifold-coupling (4).
- Step 5. Turn on the flow of water to the heat exchanger, and let it run for several minutes.
- Attach the air-purging tool to the air-purging valve at the top of the heat exchanger, and place the Step 6. drain end into a 2-liter (or larger) container to catch the water and air bubbles that escape during the filling procedure.

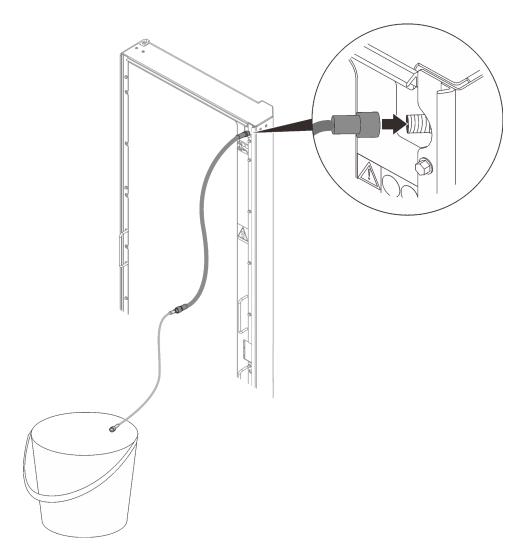


Figure 30. Installing the air-purging tool

Step 7. When there is a steady stream of liquid into the container from the air-purging tool, disconnect the tool from the heat exchanger.

Attention: If water drips from the air-purging valve after you remove the air-purging tool, reattach the tool and disconnect it again to seal the valve.

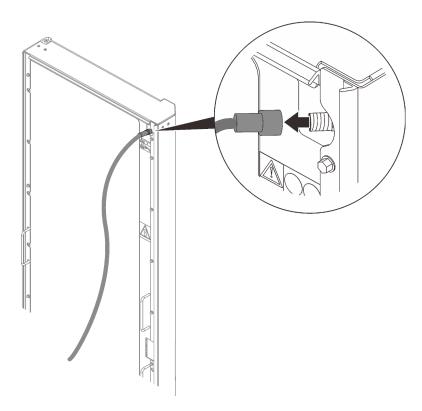


Figure 31. Removing the air-purging tool

Step 8. Install the valve cap back to the air-purging valve.

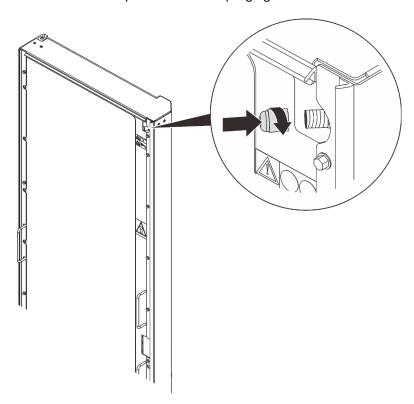


Figure 32. Installing the valve cap

Step 9. Align the hooks on the inner hose access panel with the slots on the inner side of the heat exchanger, and lower the panel to secure it.

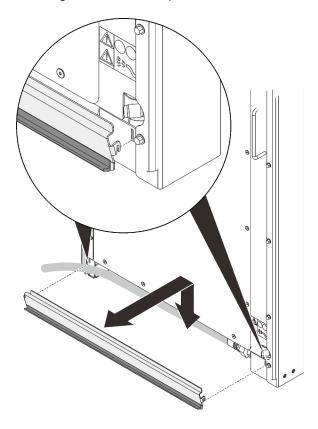


Figure 33. Installing the inner hose access panel

Step 10. Align the slots on the outer hose access panel with the hooks on the outer side of the heat exchanger, and lower the panel to attach it to the heat exchanger. Optionally, secure the panel with a M4 screw.

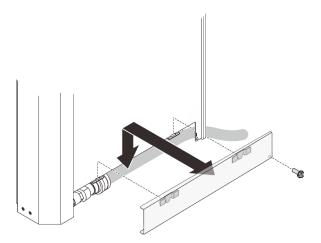


Figure 34. Installing the outer hose access panel

Chapter 3. Routing cables/hoses for water-cooled system

Adopt one of the following procedures, depending on whether the rack is in a raised-floor environment.

Important: To help maintain optimal performance and provide proper cooling for all rack components, always take the following precautions:

- Install filler panels over all unoccupied bays.
- Route signal cables at the rear of the rack so that they enter or exit the cabinet through the top and bottom air baffles.

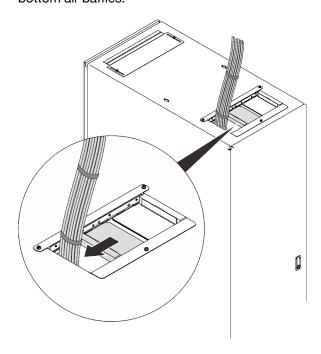


Figure 35. Managing cables with the upper air baffle

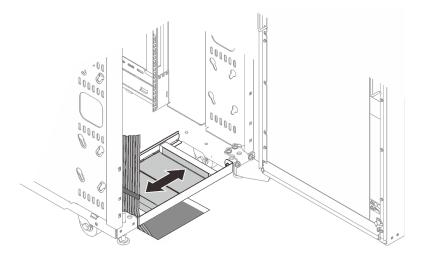


Figure 36. Managing cables with the lower air baffle

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• Bundle signal cables together in a rectangle so that the air-baffle sliders are closed as far as possible. Do not bundle signal cables together in a circular formation.

Raised-floor environment

The following illustrations show routing and securing the hoses in a raised-floor environment for individual racks and adjacent racks.

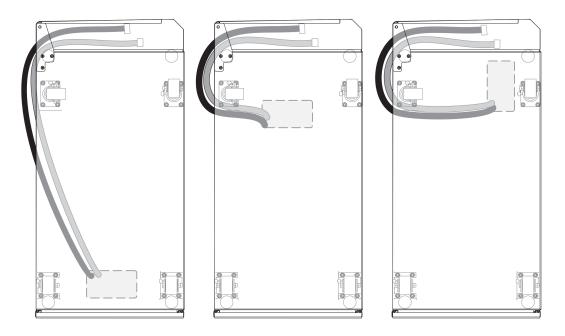
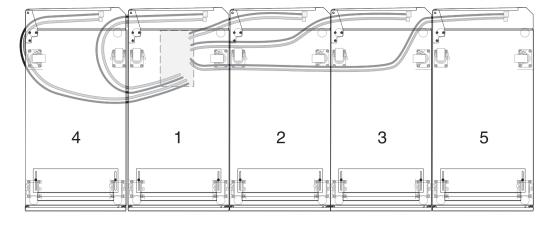


Figure 37. Routing and securing the hoses in a raised-floor environment for individual racks (from the top, looking down)

In the following illustration, the numbers represent the suggested placement of racks that share one hole in the floor. For example, if three racks will share one hole in the floor, place the racks as shown by the numbers 1, 2, and 3. If you want to add a fourth rack that will share the same hole in the floor, place it next to rack number 1.



To route and secure the hoses in a raised-floor environment, complete the following steps:

Figure 38. Option for hoses in adjacent racks to share a single hole in the floor (from the top, looking down)

Step 1. Remove the floor tile under the rack that will have an access hole cut into it.

Step 2. Cut an access hole in the floor tile; then, reinstall the floor tile. The access hole for the supply and return hoses must be a minimum of 200 mm (8 in.) long x 100 mm (4 in.) wide.

Notes:

- Each hose must be routed through the access hole lengthwise so that the hose has the entire 200 mm (8 in.) to pass through the floor. If adjacent racks share a hole in the floor, increase the size of the hole according to the number of hoses, 50 mm (2 in.) in length for every rack. For example, the hole for one rack is 100 x 200 mm (4 x 8 in.), the hole for two racks is 150 x 200 mm (6 x 8 in.), and so on. Smaller hole sizes might also work, depending on the hose routing underneath the raised floor.
- Each hose must be routed with a minimum bend radius of 200 mm (8 in.). A bend radius less than 200 mm (8 in.) will cause the hose to kink, will restrict the flow of water to and from the heat exchanger, and will void the heat exchanger warranty.
- Step 3. Route the hoses through the access hole lengthwise, under the rack and around the rear caster on the pivot side of the heat exchanger. See "Filling the heat exchanger with water" on page 48 for information about how to connect the hoses.
- Step 4. Check the heat exchanger for air in the manifolds again after one month of operation, to ensure that the heat exchanger is filled correctly.

Raised-floor and non-raised-floor environments

If the coolant distribution unit (CDU) that is providing water to the heat exchanger is in a row of racks with heat exchangers, all hoses can be routed on the floor, irrespective of if it is a raised floor or slab installation. The Type 7D6D rack has sufficient clearance underneath the rack to enable the ball valves to be run underneath the rack. This provides a very clean hose-routing solution with hoses of minimum length.

Note: Each hose must be routed with a minimum bend radius of 200 mm (8 in.). A bend radius less than 200 mm (8 in.) will cause the hose to kink, will restrict the flow of water to and from the heat exchanger, and will void the heat exchanger warranty.

Step 1. If the hoses must be run overhead, either route the hoses through the rack vertically, or route them vertically down the hinge (pivot) side of the heat exchanger, leaving enough slack in the hoses to reach the couplings.

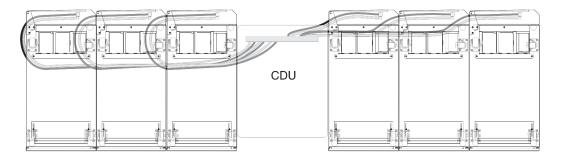


Figure 39. Routing and securing the hoses in raised-floor and non-raised-floor environments (from the top, looking down)

- Step 2. After several hours of operation, repeat the air-purging procedure on the valve (trapped air from the hoses might have migrated to the heat exchanger). To perform the air-purging procedure, complete step 7 on page 52 through step 10 on page 52 in Filling the heat exchanger with water.
- Step 3. Check the heat exchanger for air in the manifolds again after one month of operation, to ensure that the heat exchanger is filled correctly.

Chapter 4. Rear Door Heat eXchanger V2 replacement

See this topic to learn how to remove and install Rear Door Heat eXchanger V2 and subsidiary components.

Drain the heat exchanger of water

See this topic to learn how to drain the heat exchanger of water.

About this task

S038



CAUTION:

Eye protection should be worn for this procedure.

Attention: Wear safety goggles or other eye protection whenever you fill, drain, or purge air or nitrogen from the heat exchanger.

Procedure

Step 1. Lift and remove the inner hose access panel from the heat exchanger.

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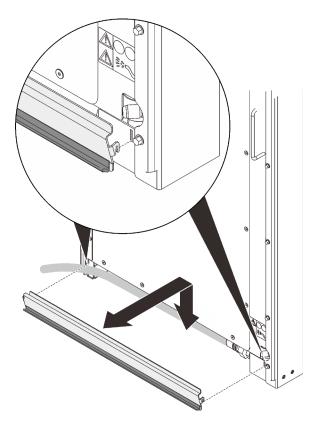


Figure 40. Removing the inner hose access panel

Step 2. Remove the screw that secures the panel if applicable, then lift and remove the panel from the heat exchanger.

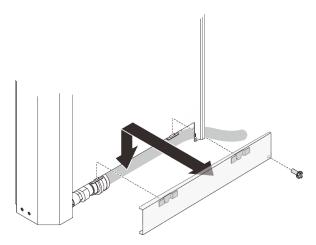


Figure 41. Removing the outer hose access pane

Step 3. Disconnect the return and supply hose from the manifolds, and remove them from the heat exchanger.

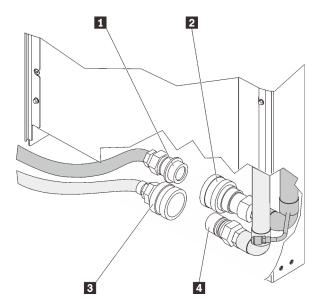


Figure 42. Supply and return hoses and manifold couplings

- Remove the supply hose assembly (11) from the supply manifold-coupling (2).
- Remove the return hose assembly (13) from the return manifold-coupling (14).

Step 4. Remove the caps from the air-purging and drain valve.

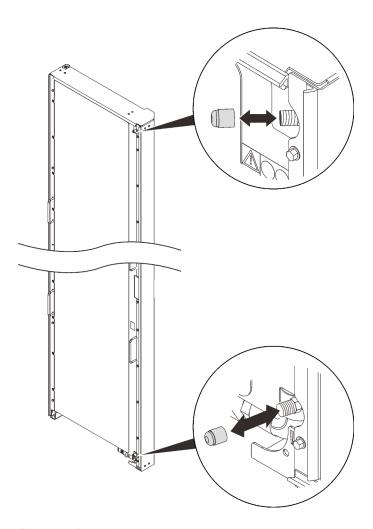


Figure 43. Removing valve caps

Step 5. Remove the extension hose from the air-purging tool.

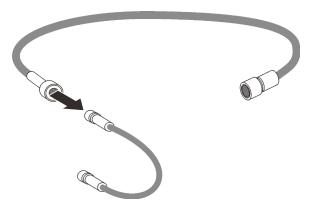


Figure 44. Removing the extension hose

Step 6. Insert one end of the air-purging tool extension hose into the center of air-purging valve stem at the top of the heat exchanger to allow air to enter the manifolds.

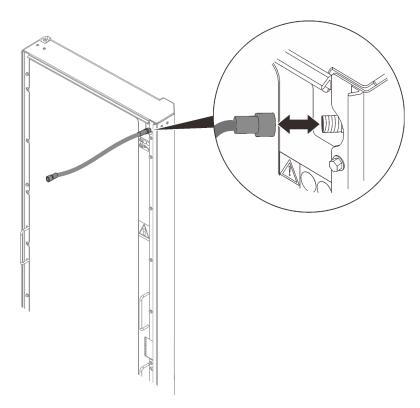


Figure 45. Inserting the air-purging tool extension hose

Step 7. Attach the air-purging tool to the drain valve at the bottom of the heat exchanger, and place the drain end into a 2-liter (or larger) container to catch the water.

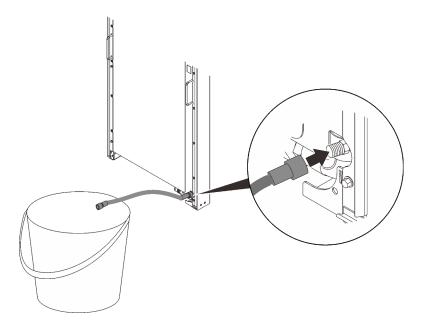


Figure 46. Draining water

Step 8. When the water is drained completely, remove the air-purging-tool extension hose from the valve.

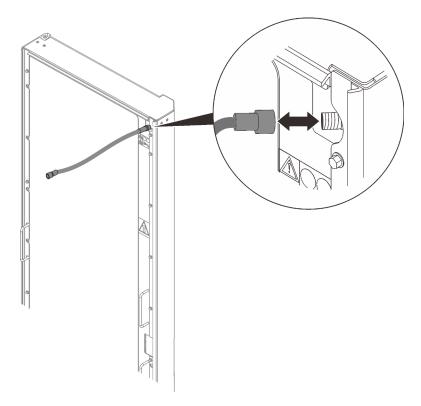


Figure 47. Removing the air-purging tool extension hose

Step 9. Remove the air-purging tool from the drain valve.

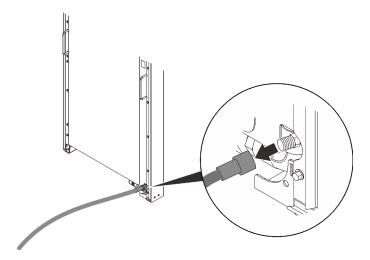


Figure 48. Removing the air-purging tool

Step 10. Install the two caps back to the air-purging and drain valve.

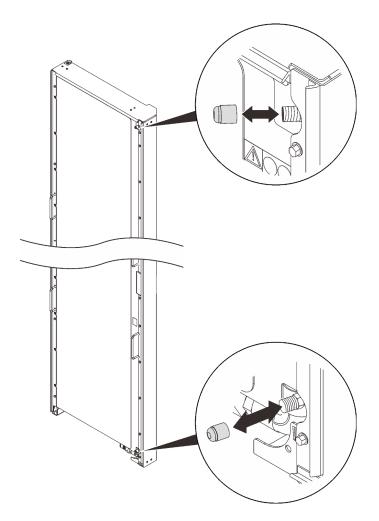


Figure 49. Installing the valve caps

Remove Rear Door Heat eXchanger V2

See this topic to learn how to remove ThinkSystem Rear Door Heat eXchanger V2.

About this task

S036



18 - 32 kg (39 - 70 lb)



32 - 55 kg (70 - 121 lb)

CAUTION:

Use safe practices when lifting.

S010



CAUTION:

Do not place any object weighing more than 82 kg (180 lb) on top of rack-mounted devices.

S019



CAUTION:

The power-control button on the device does not turn off the electrical current supplied to the device. The device also might have more than one connection to dc power. To remove all electrical current from the device, ensure that all connections to dc power are disconnected at the dc power input terminals.

R007





- Connect power cords from devices in the rack cabinet to electrical outlets that are near the rack cabinet and are easily accessible.
- · Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet before you service any device in the rack cabinet.
- Install an emergency-power-off switch if more than one power device (power distribution unit or uninterruptible power supply) is installed in the same rack cabinet.
- . Connect all devices that are installed in a rack cabinet to power devices that are installed in the same rack cabinet. Do not connect a power cord from a device that is installed in one rack cabinet to a power device that is installed in a different rack cabinet.

R004



CAUTION:

See the instructions in the rack documentation before you install devices, remove devices, or relocate the rack.

S038



CAUTION:

Eye protection should be worn for this procedure.

Procedure

- Step 1. Drain the water from the heat exchanger completely (see "Drain the heat exchanger of water" on page 37).
- Step 2. Hold the heat exchanger in place with two people, and remove the top hinge. Depending on the configuration, select the corresponding removal procedures:
 - · Without rack extension kit installed

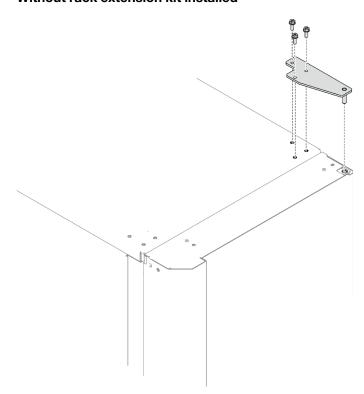


Figure 50. Removing the top hinge

Unfasten the three screws to remove the top hinge.

• With 42U Advanced Rack Extension Kit installed

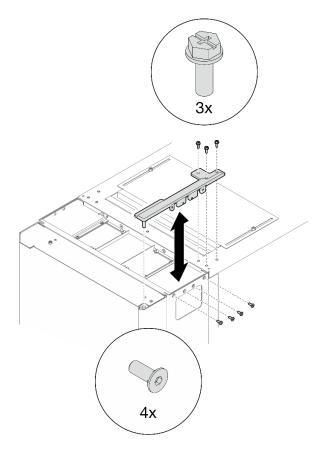


Figure 51. Removing the top hinge

Unfasten the seven screws to remove the top hinge.

• With 42U Standard Rack Extension Kit installed

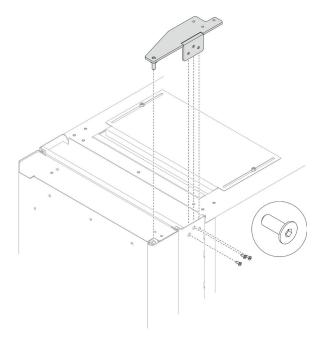


Figure 52. Removing the top hinge

Unfasten the three screws to remove the top hinge.

Step 3. Hold the heat exchanger with three people on the handles/spots as illustrated.

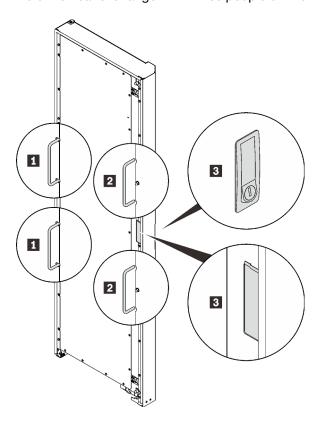


Figure 53. Lifting the heat exchanger with three people

1 Handles that the first person hold on to	Spots that the third person hold on to
2 Handles that the second person hold on to	

Step 4. Lift the heat exchanger with three people as described in the previous step, and remove it from the rack cabinet.

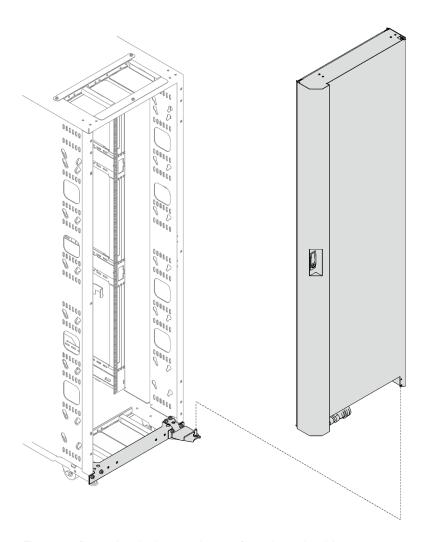


Figure 54. Removing the heat exchanger from the rack cabinet

Install Rear Door Heat eXchanger V2

See this topic to learn how to install ThinkSystem Rear Door Heat eXchanger V2.

About this task

S036



18 - 32 kg (39 - 70 lb)

32-55 kg 70-121 lb

32 - 55 kg (70 - 121 lb)

CAUTION:

Use safe practices when lifting.

<u>S010</u>



CAUTION:

Do not place any object weighing more than 82 kg (180 lb) on top of rack-mounted devices.

S019



CAUTION:

The power-control button on the device does not turn off the electrical current supplied to the device. The device also might have more than one connection to dc power. To remove all electrical current from the device, ensure that all connections to dc power are disconnected at the dc power input terminals.

R007





- Connect power cords from devices in the rack cabinet to electrical outlets that are near the rack cabinet and are easily accessible.
- Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet before you service any device in the rack cabinet.
- Install an emergency-power-off switch if more than one power device (power distribution unit or uninterruptible power supply) is installed in the same rack cabinet.
- Connect all devices that are installed in a rack cabinet to power devices that are installed in the same rack cabinet. Do not connect a power cord from a device that is installed in one rack cabinet to a power device that is installed in a different rack cabinet.

R004



CAUTION:

See the instructions in the rack documentation before you install devices, remove devices, or relocate the rack.

S038



CAUTION:

Eye protection should be worn for this procedure.

Procedure

Step 1. (With 42U Advanced Rack Extension Kit installed only) Make sure the three support brackets are removed from the extension panels.

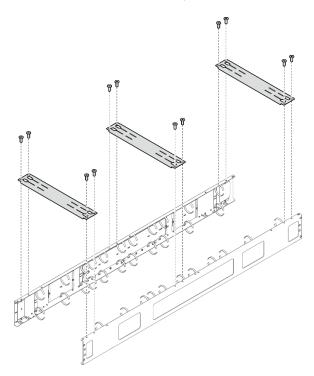
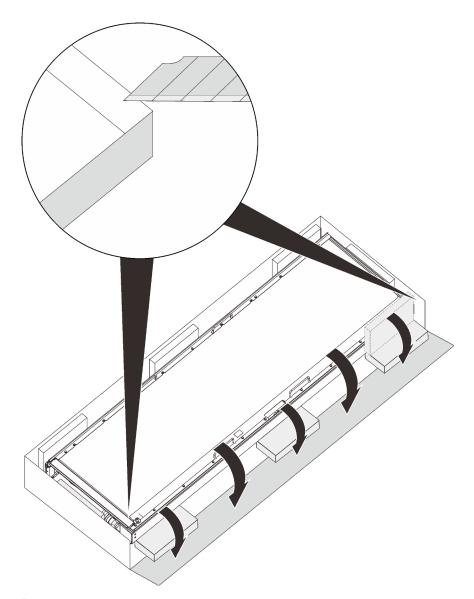


Figure 55. Removing the support brackets

Step 2. Face the bottom side of the carton, remove the carton top, and slit the two carton corners on your right-hand side with a knife. Then, fold the right carton panel down to the ground, and rotate the threes carton inserts down.



Bottom

Figure 56. Unpacking the heat exchanger

Step 3. With three people, rotate the heat exchanger to vertical on the three carton inserts. Then, remove the inner and outer hose access panels while one person hold the heat exchanger.

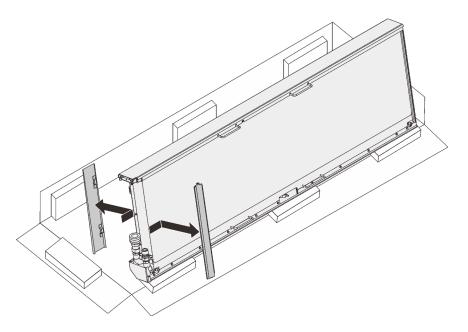


Figure 57. Removing the hose access panels

Step 4. Hold the heat exchanger with three people on the handles/spots as illustrated. Then, carefully lift the heat exchanger and turn it upright.

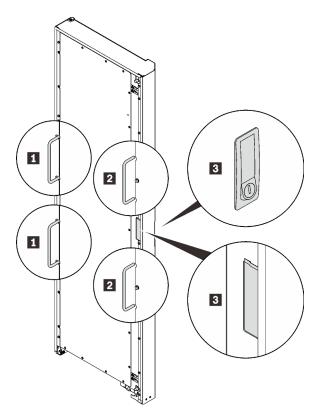


Figure 58. Lifting the heat exchanger with three people

■ Handles that the first person hold on to	Spots that the third person hold on to
■ Handles that the second person hold on to	

Step 5. Carry the heat exchanger with three people to the cabinet frame. Align the bottom corner with the bottom hinge pin on the rack cabinet; then, lower the heat exchanger to fit the pin in.

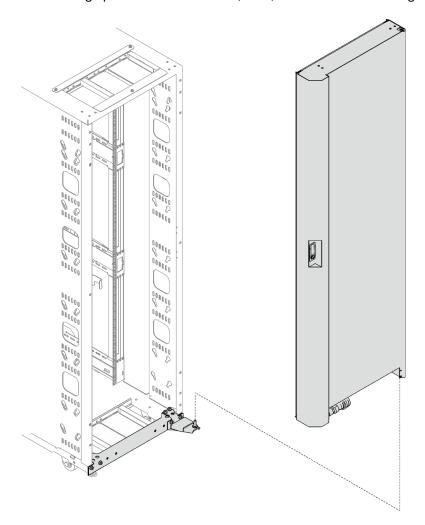


Figure 59. Installing the heat exchanger to the rack cabinet

- Hold the heat exchanger in place with two people, and install the top hingeDepending on the Step 6. configuration, select the corresponding installation procedures:
 - · Without rack extension kit installed

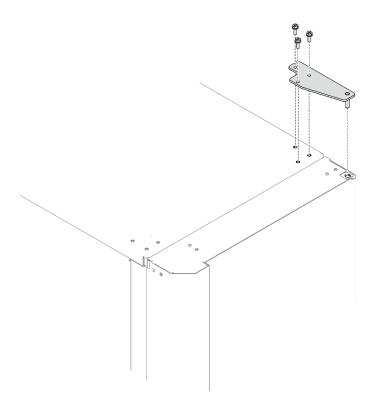


Figure 60. Installing the top hinge

Insert the top hinge pin to the heat exchanger; then, secure the hinge with three screws.

• With 42U Advanced Rack Extension Kit installed

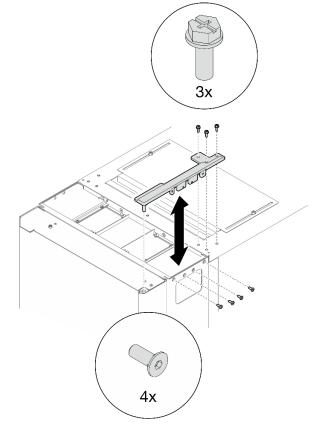


Figure 61. Installing the top hinge

Insert the top hinge pin to the heat exchanger; then, secure the hinge with seven screws.

• With 42U Standard Rack Extension Kit installed

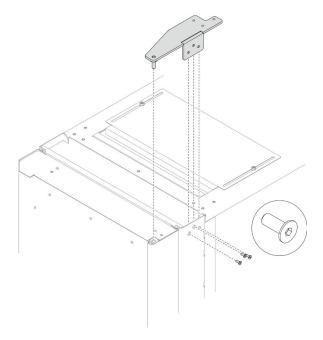


Figure 62. Installing the top hinge

Insert the top hinge pin to the heat exchanger; then, secure the hinge with three screws.

After this task is completed

Proceed to "Fill the heat exchanger with water" on page 56.

Fill the heat exchanger with water

See this topic to learn how to fill ThinkSystem Rear Door Heat eXchanger V2 with water.

About this task

S038



CAUTION:

Eye protection should be worn for this procedure.

Attention: Wear safety goggles or other eye protection whenever you fill, drain, or purge air or nitrogen from the heat exchanger.

Procedure

Step 1. If the inner hose access panel is installed, lift and remove it from the heat exchanger.

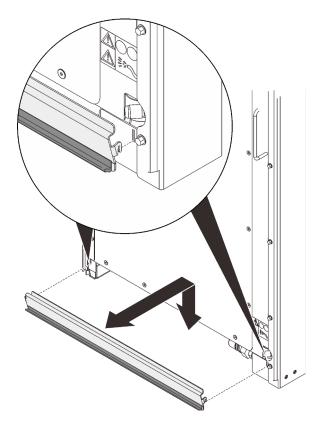


Figure 63. Removing the inner hose access panel

Step 2. If the outer hose access panel is installed, remove the screw that secures the panel (if applicable), then lift and remove the panel from the heat exchanger.

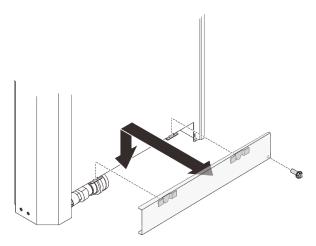


Figure 64. Removing the outer hose access panel

Step 3. Purge the nitrogen that has been filled in the hose from the hose.

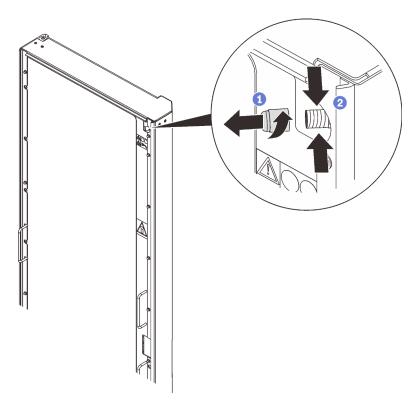


Figure 65. Purging nitrogen

- 1 Loosen and remove the cap from the air-purging valve.
- 2 Press in on the valve stem of the air-purging valve to purge the nitrogen from the heat exchanger. Continue holding in the valve stem until the pressure is released.
- Step 4. Align the supply hose coupling with the supply manifold, push it in and pull the collar backward until it locks in place with an audible click. Then, repeat the same procedure on the return hose and manifold.

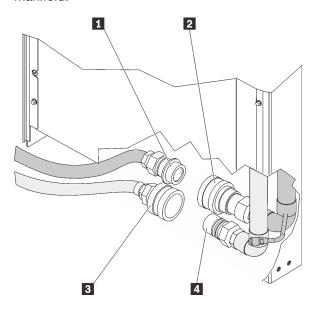


Figure 66. Supply and return hoses and manifold couplings

- Connect the supply hose assembly (11) to the supply manifold-coupling (12).
- Connect the return hose assembly (3) to the return manifold-coupling (4).
- Step 5. Turn on the flow of water to the heat exchanger, and let it run for several minutes.
- Step 6. Attach the air-purging tool to the air-purging valve at the top of the heat exchanger, and place the drain end into a 2-liter (or larger) container to catch the water and air bubbles that escape during the filling procedure.

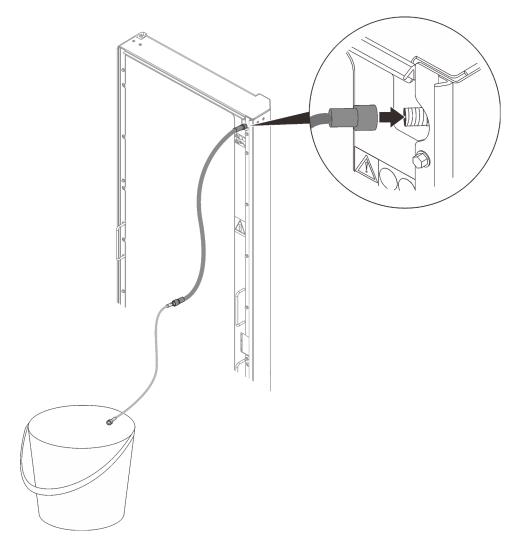


Figure 67. Installing the air-purging tool

Step 7. When there is a steady stream of liquid into the container from the air-purging tool, disconnect the tool from the heat exchanger.

Attention: If water drips from the air-purging valve after you remove the air-purging tool, reattach the tool and disconnect it again to seal the valve.

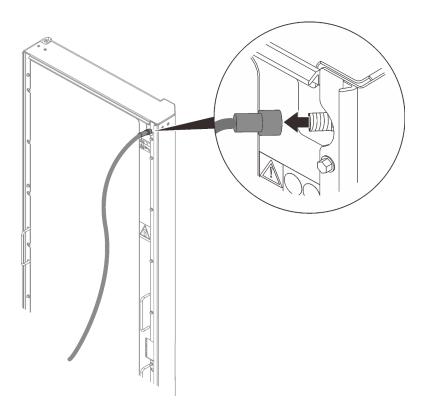


Figure 68. Removing the air-purging tool

Step 8. Install the valve cap back to the air-purging valve.

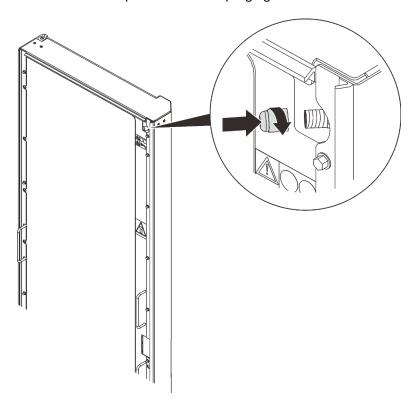


Figure 69. Installing the valve cap

Step 9. Align the hooks on the inner hose access panel with the slots on the inner side of the heat exchanger, and lower the panel to secure it.

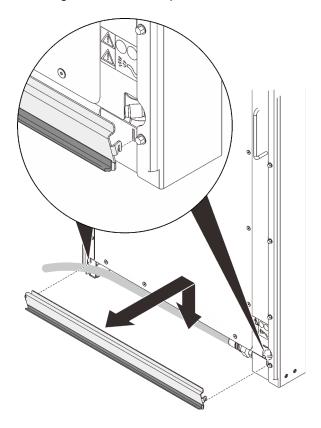


Figure 70. Installing the inner hose access panel

Step 10. Align the slots on the outer hose access panel with the hooks on the outer side of the heat exchanger, and lower the panel to attach it to the heat exchanger. Optionally, secure the panel with a M4 screw.

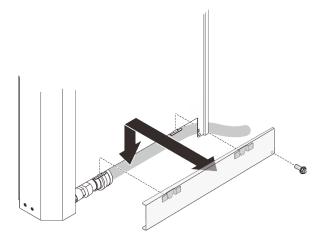


Figure 71. Installing the outer hose access panel

Replace the door latch

See this topic to learn how to replace the door latch of Rear Door Heat eXchanger.

Procedure

Step 1. Remove the screw that secure the latch to the heat exchanger; then, secure the replacement unit with the same screw.

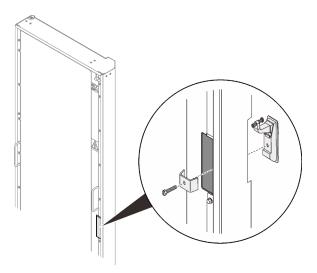


Figure 72. Replacing the door latch

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support are available at:

http://datacentersupport.lenovo.com

Note: This section includes references to IBM web sites and information about obtaining service. IBM is Lenovo's preferred service provider for ThinkSystem.

Before you call

Before you call, there are several steps that you can take to try and solve the problem yourself. If you decide that you do need to call for assistance, gather the information that will be needed by the service technician to more quickly resolve your problem.

Attempt to resolve the problem yourself

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

You can find the product documentation for your ThinkSystem products at the following location:

http://thinksystem.lenovofiles.com/help/index.jsp

You can take these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- If you have installed new hardware or software in your environment, check https://static.lenovo.com/us/en/serverproven/index.shtml to make sure that the hardware and software is supported by your product.
- Go to http://datacentersupport.lenovo.com and check for information to help you solve the problem.
 - Check the Lenovo forums at https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Gathering information needed to call Support

If you believe that you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare before you call. You can also see http://datacentersupport.lenovo.com/warrantylookup for more information about your product warranty.

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Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier)
- Model number
- Serial number
- Current system UEFI and firmware levels
- Other pertinent information such as error messages and logs

As an alternative to calling Lenovo Support, you can go to https://support.lenovo.com/servicerequest to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to the service technicians. The Lenovo service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to https://datacentersupport.lenovo.com/ serviceprovider and use filter searching for different countries. For Lenovo support telephone numbers, see https://datacentersupport.lenovo.com/supportphonelist for your region support details.

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