



# • D8 ADVANCE

## with Sealed Tube X-ray Source

Pre-installation Guide  
(For installations in North America)

### Purpose

This Pre-installation Guide will aid you and any required personnel in site preparation prior to installation of the system.

Read these instructions carefully and thoroughly to prepare for installation of the system. Proper site planning will ensure optimum efficiency, maintenance access, proper instrument performance, and avoidance of unnecessary delays during installation.

### Responsibility

The customer is responsible for making certain that the basic site requirements for the system are fulfilled. These instructions are to be followed by the customer and by customer-contracted tradespeople, except where otherwise noted.

### Disclaimer

All configurations and specifications are subject to change without notice.

### Pre-installation Summary

D8 ADVANCE pre-installation summary

Power	
208-240 VAC, 50/60 Hz, 1-phase, 40 A fuses/breakers	K430 X-ray generator, enclosure controller, and goniometer control electronics
208-230 VAC, 60 Hz, 1-phase, 15 A fuse/breaker	Haskris LX2 water recirculator
110-220 VAC, 50/60 Hz, 1-phase, 15 A fuse/breaker	Control computer (powered from the in-house mains system)

Cooling Water	
Cooling capacity	3400 W (11601 btu/hr)
Temperature	10° - 20° C ± 1° C (50° - 68° F ± 2° F)
Pressure	4 - 6 bar (60 - 90 psi)
Quantity*	4.9 l (1.3 gal)

\*Quantity specified is for Haskris LX2. Use distilled water.

Communications	
RJ-11 Telephone line	Voice connection near instrument
RJ-45 (Ethernet) Network connection	Remote diagnosis over the internet

## Radiation Safety

Radiation safety can be separated into two categories:

- **Instrument:** Bruker is authorized to provide installation, service, and preventive maintenance of all Bruker analytical X-ray systems. Bruker is also authorized to provide training and consultation on these systems' operation and safety features.
- **State, Province, and/or Commonwealth:** Bruker is NOT authorized—and is strictly forbidden—to provide consultation services regarding your local state, province, and/or commonwealth regulatory requirements.

You, as the customer, are required to contact the agency in your state or province that regulates the X-ray instrument's registration, receipt, and/or use (i.e., your local state or province may or may not require you to have a Radiation Safety Officer on-site, use standard operating procedures, use dosimetry badges, conduct an annual radiation check, etc.).

If you have any questions, please do not hesitate to call Bruker at 1 (800) 234-XRAY [9729] and ask to speak with the Radiation Safety Officer. Be aware that the Radiation Safety Officer's advice may be limited or incomplete due to commonwealth regulatory restrictions.

## Specifications

### X-ray Enclosure Dimensions

The system is equipped with integrated casters for easier transportation inside the laboratory. Side, rear, and front panels can be removed for moving the system through doors. The X-ray enclosure may be detached from the base cabinet for transport. The enclosure and base cabinet are connected both mechanically (i.e., with screws) and electrically. Both electrical and mechanical connections must be separated before attempting to detach the enclosure and base cabinet.

The assembled system (with its enclosure rear and side panels removed for transportation) can be moved through a door with a width of 91.4 cm (36.0").

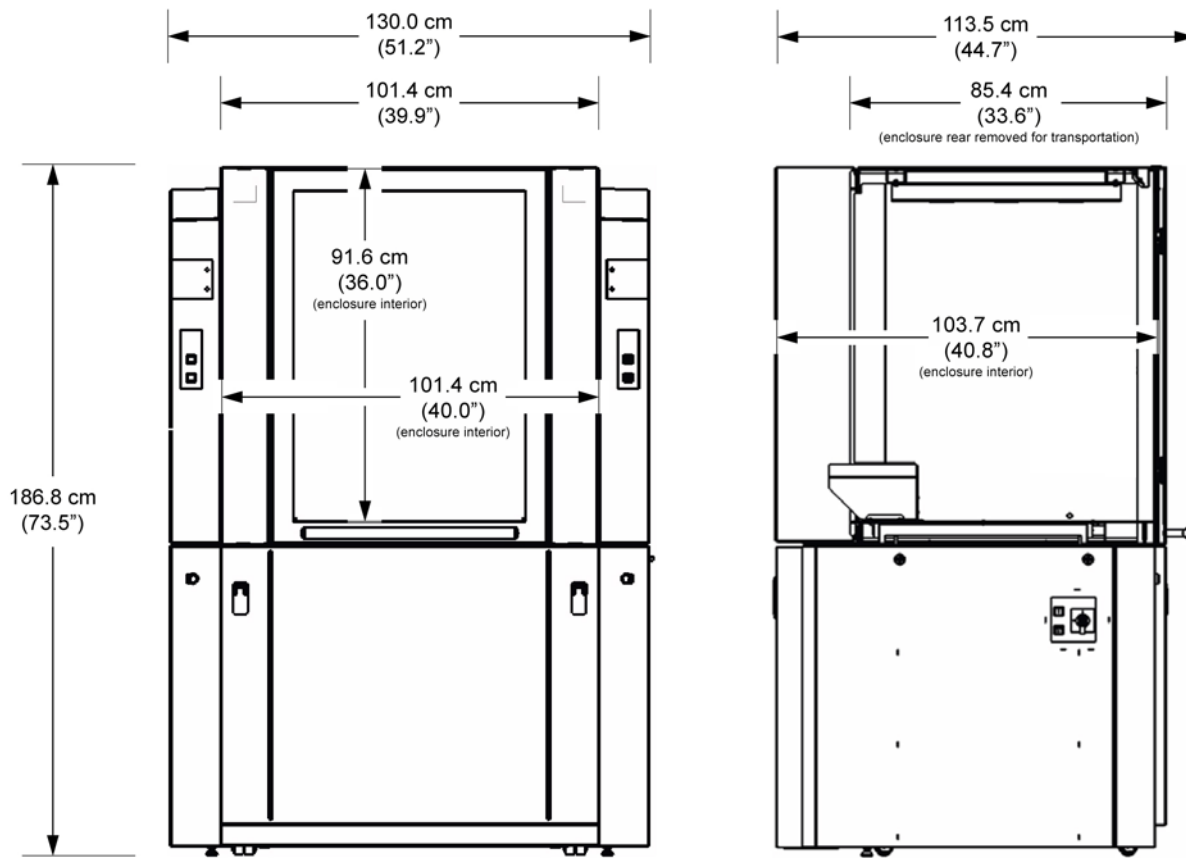
Table 1. Crated dimensions

Dimensions	Height	Width	Depth
Crate 1 (large)	150.0 cm (59.1")	130.0 cm (51.2")	150.0 cm (59.1")
Crate 2 (small)	150.0 cm (59.1")	130.0 cm (51.2")	130.0 cm (51.2")

Table 2. Installed dimensions

Dimensions	Height	Width	Depth
Cabinet and enclosure ready for operation	186.8 cm (73.5")	130.0 cm (51.2")	113.5 cm (44.7")
Transport size on casters	186.8 cm (73.5")	130.0 cm (51.2")	85.4 cm (33.6")
Space inside enclosure	91.6 cm (36.0")	101.4 cm (40.0")	103.7 cm (40.8")

Figure 1. Dimensions



## System Weight

When used in a sealed-tube configuration, the D8 ADVANCE’s total system weight is approx. 770 kg (1700 lbs), requiring a floor load capacity of 1300 kg/m<sup>2</sup> (266.3 lbs/ft<sup>2</sup>).

## Heat Dissipation

Table 3. D8 ADVANCE components’ heat dissipation to air

Component	Heat Dissipation to Air
K430 X-ray generator	500 W (1706 btu/hr) to air at full load 3500 W (11942 btu/hr) to water at full load
Enclosure controller and goniometer control electronics	Max. 800 W (2730 btu/hr)
Haskris LX2 water recirculator (installed in a separate room)	Water-to-air: 3000 W (10200 btu/hr) Water-to-water: negligible
Control computer	Max. 165 W (563 btu/hr)

# Requirements

## Environment Requirements

Table 4. Environment requirements

Room/Instrument	Requirements
Room operation-range temperature	Maximum: 15.0° - 35.0° C (59.0° - 95.0° F) Recommended: 20.0° - 28.0° C (68.0° - 82.4° F) Avoid direct sunlight.
Maximum temperature gradient	1.0° C (1.8° F) per hour
Relative humidity	20% - 80%, condensation not allowed
Wall-to-instrument-rear clearance	70.0 cm (27.6") recommended. Although the instrument has wheels, it should be accessible from all sides for proper servicing and airflow.
Heat dissipation to the air (instrument)	Dissipated heat must be removed by a ventilation or air-cooling system. Cooling air should flow around the instrument without restriction. If possible, locate the air conditioning and heating ducts so that their airflow is not aimed directly at the instrument. We recommend a clean, dust-free environment.
Heat dissipation to the air (water recirculator)	To avoid heat near the diffractometer, the water recirculator should be installed in a separate room. If the water recirculator is installed in a closed room, ensure that the waste heat is carried away and fresh air is supplied.
Static electricity elimination (to avoid adverse effects on instrument electronics)	Any carpeting in the area should be conductive. If the area is carpeted with non-conductive carpet, we recommend that you place anti-static mats over the conventional carpeting in the area around the instrument.

## Area of Installation

The installation of the devices must be planned such that the diffractometer is accessible from all sides and the cooling air can flow without restrictions. A minimum of 70.0 cm (27.6") free space must be provided behind the diffractometer and on both sides.

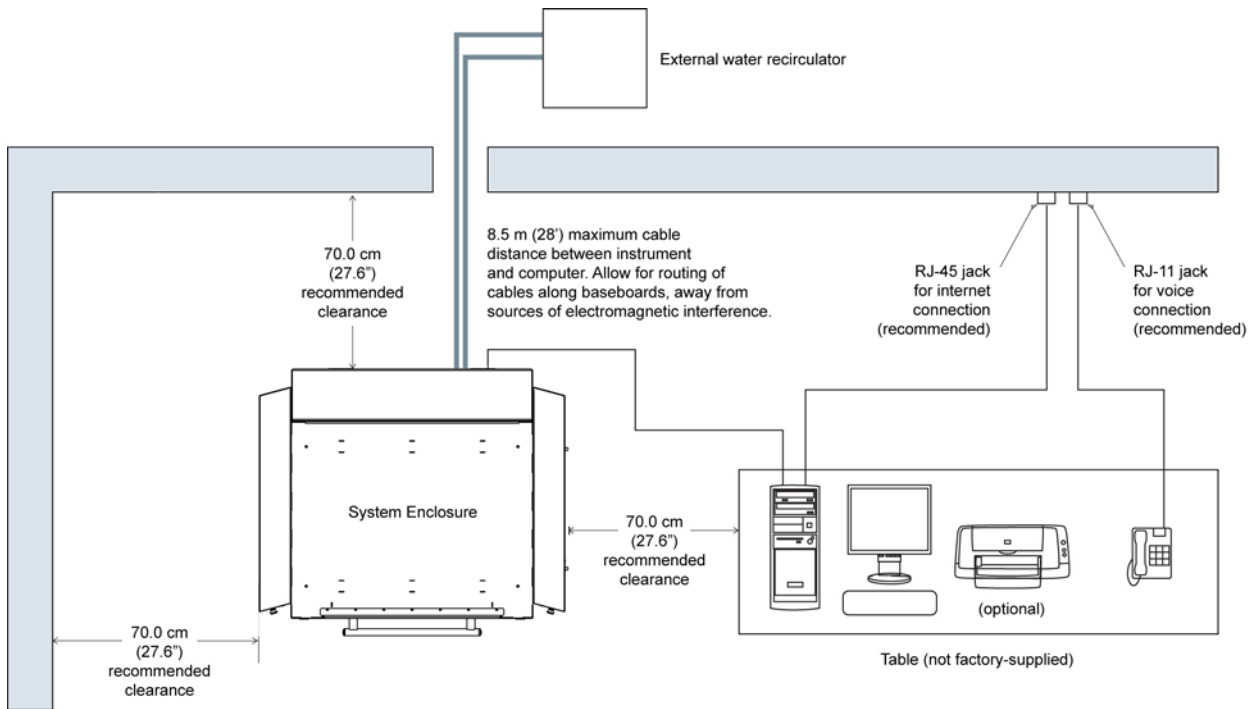
The floor should be level and with a sufficient supporting capacity.

Avoid direct solar radiation.

To avoid heat near the diffractometer, the external cooling-water unit (if required) should be installed in a separate room. If the external cooling-water unit is installed in a closed room, make sure that the waste heat is carried off and fresh air is supplied.

## Typical Floor Plan

Figure 2. Typical floor plan arrangement (sealed-tube configuration)



## Air Quality and High-Precision Optics

The system uses high-precision optical devices that may be exposed to harmful environmental conditions. Generation of ozone near the optics' surface by the X-ray beam can cause chemical reactions with contaminants in the air. The end products of these reactions may result in degradation of the optics' performance. Therefore, clean and dry laboratory conditions are highly recommended. The cooling water's temperature must be high enough to avoid condensation. Avoid continuous water flow while the generator power is switched off.

Despite these precautions, it may be necessary to periodically clean the optics. Contact Bruker for support.

## Changing the System's Location

With each permanent location change, the following points must be considered:

- Before permanently changing the location of the system, please consult your local Bruker Service Representative.
- All mechanical vibrations are to be avoided during system transport. Otherwise, sensitive physical components may be damaged.
- The mains connection at the new location must meet the requirements given in the system's Pre-installation Guide.
- At the new location, make sure that all local radiation protection regulations and operation permits are strictly observed.
- All documentation (e.g., manuals, radiation and other safety certificates) must be moved together with the instrument.

## Electrical Requirements

- Use the supplied power cable to connect the instrument. The power cable is 6.1 m (20 ft) long, of which 1.2 m (4 ft) are inside the enclosure.

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**NOTE:** If the power line voltage at your site fluctuates outside the required values, a compatible line voltage conditioner or regulator may be necessary. Check with your site's electrical coordinator.

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- On the wall behind the instrument, connect power from the building mains to a labeled direct-wired circuit breaker/disconnect box so that power to the instrument can be interrupted if necessary.
- Wire the room air conditioner and any external pumps to a different electrical circuit than that used for the instrument. High starting currents from their motors may adversely affect line voltage stability. Additionally, provide a separate electrical power circuit for the Haskris LX2 water recirculator.
- If the supply neutral is grounded, it should have the same potential as the earth point on the instrument.

Table 5. D8 ADVANCE electrical requirements

Service Required	Component(s) Using the Service	Voltage	Frequency	Phases	Current Draw
208-240 VAC, 50/60 Hz, 1-phase, 40 A fuses/breakers <sup>1 2 3</sup> Incoming voltage range cannot be below 208 or above 230.	K430 X-ray generator	180-250 VAC	50/60 Hz	1-phase	21 A
	Enclosure controller and goniometer control electronics	208-240 VAC	50/60 Hz	1-phase	3 A
208-230 VAC, 60 Hz, 1-phase, 15 A fuse/breaker <sup>3</sup>	Haskris LX2 water recirculator	208-230 VAC	60 Hz	1-phase	15 A
110-220 VAC, 50/60 Hz, 1-phase, 15 A fuse/breaker	Frame buffer PC (powered from the in-house mains system)	110-220 VAC	50/60 Hz	1-phase	15 A

<sup>1</sup> If fuses are used, use slow-blow fuses.

<sup>2</sup> Additional accessories will require additional power.

<sup>3</sup> Customer to supply plug or shut-off box.

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**NOTE:** For both the system and the water recirculator, it is the customer's responsibility to supply the proper connection (e.g., breaker box, shutoff box, power cable connector) to the installation site's power mains.

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Figure 3. D8 ADVANCE recommended electrical connections

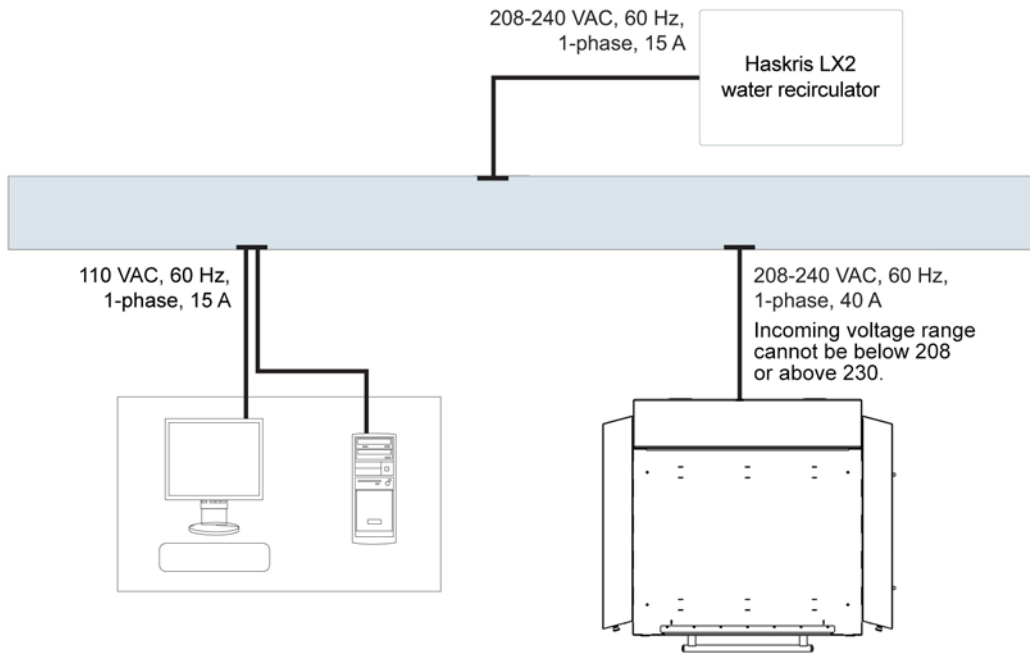
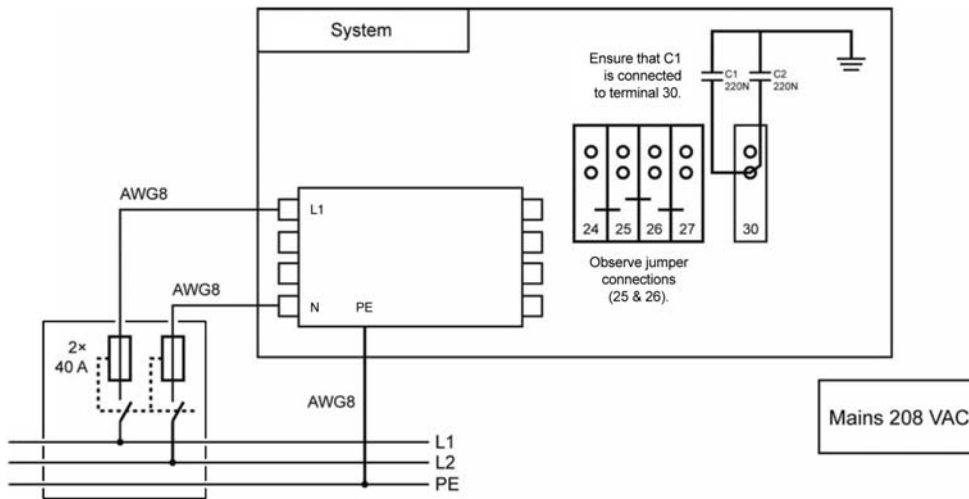


Figure 4. D8 ADVANCE electrical connections (schematic)



**⚠ DANGER**  
 If the mains power is incorrectly connected, damage to the instrument WILL occur!

## Using Optional Power Conditioners and UPSs

If the power supply is unstable, a power conditioner and/or UPS (uninterruptible power supply) may be installed between the mains supply and the instrument.

### The Powervar Power Conditioner

Figure 5. Powervar power conditioner

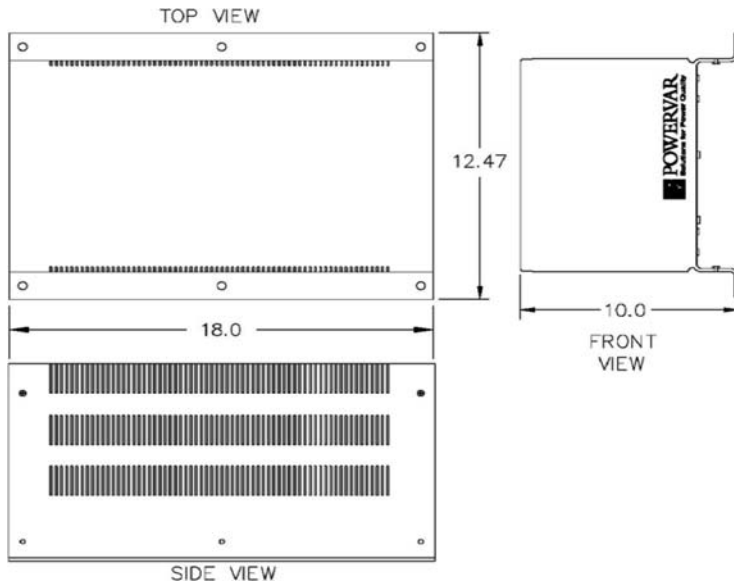


Table 6. Powervar power conditioner

<b>Powervar Power Conditioner (Bruker Part Number 862-107200)</b>	
Dimensions	25.4 cm × 45.7 cm × 31.67 cm (10.0" × 18.0" × 12.47")
Shipping Weight	59 kg (130 lbs)
Mounting	Wall-mountable, or can be mounted inside the instrument's base cabinet where space permits



## The Powervar UPS

Figure 6. Powervar UPS

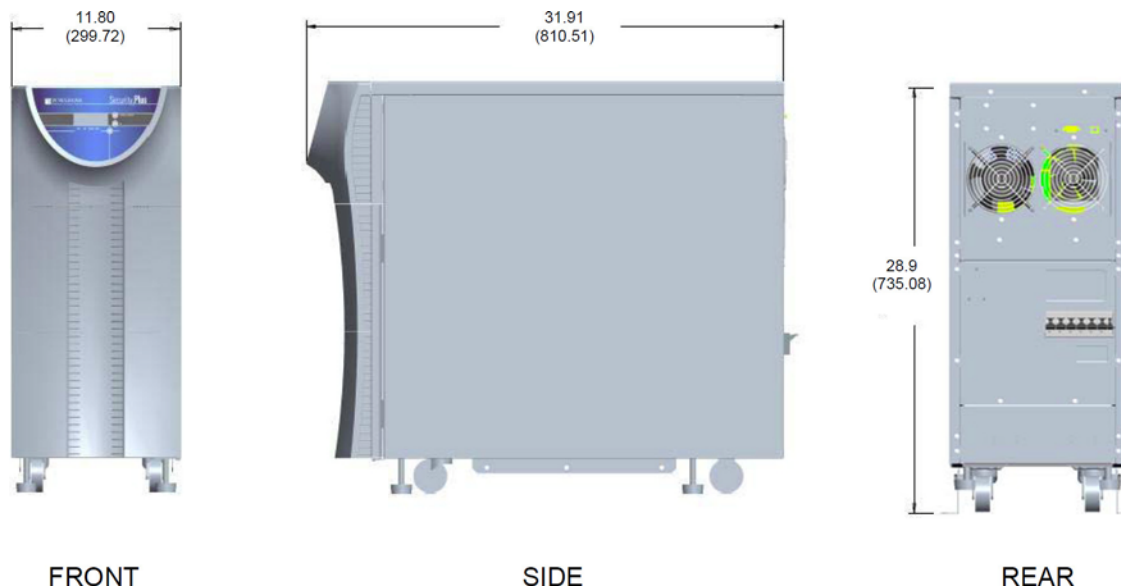


Table 7. Powervar UPS

Powervar UPS (Bruker Part Number 862-100000)	
Nominal output power	6 kVA (4.8 kW)
Input voltage/frequency	208-239 VAC, 42 - 69 Hz, 1-phase
Output voltage/frequency	120/208/240 VAC, 50/60 Hz $\pm$ 0.1 Hz (factory-selectable), 1-phase
Backup time	> 6.0 min. at full charge
Dimensions	73.4 cm $\times$ 30.0 cm $\times$ 81.1 cm (28.9" $\times$ 11.8" $\times$ 31.9")
Shipping weight	200 kg (443 lbs)
Heat dissipation	953 W (3252 btu/h)

## Communication Requirements

Table 8. Communication requirements

Connection	Connector	Purpose
Telephone line (recommended)	RJ-11	Voice connection near instrument
Network connection (recommended)	RJ-45 (Ethernet)	Remote diagnosis over the internet

**NOTE:** Bruker's Remote Diagnosis features are now available over the internet (i.e., WebEx). Check with your IT administrator to find out how Remote Diagnosis may affect your IT policy.

## Cooling Requirements

Cooling requirements vary according to the instrument configuration:

- The sealed-tube source is cooled by an external closed-circuit water recirculator.
- Additional accessories may require additional cooling. Consult the manufacturer's documentation for your specific accessory.

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**NOTE:** If you do not wish to install a closed-circuit water recirculator, contact Bruker for more information.

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### CAUTION

Damage to system components due to improper cooling water is not covered by warranty.

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During installation, the Bruker Field Service Engineer will connect customer-supplied couplings and the two factory-supplied 10 m (32.5'), 12 mm (½") 15 mm (0.6") inside diameter hoses between the water supply and the return line to the instrument. The ends of the pipe require shutoff valves where they connect to the instrument. Install barbed fittings (supplied) to connect the hoses to the generator.

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**NOTE:** The recirculator's water valve opens only when it needs cooling. This keeps water consumption to a minimum (particularly important for open cooling system arrangements).

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Table 9. Cooling water specifications

Cooling Water Specifications	
Maximum distance between the instrument and the external water recirculator	15 m (48')
Maximum elevation difference	6 m (20')
Filtration	Ensure that the water is free of suspended matter.
Temperature stability	± 0.5° C acceptable, ± 0.1° C recommended
Conductivity	< 1 µS/cm (an ion exchanger is required)
Hardness	< 300 mg/l CaO
pH	Neutral (6-7)

## Cooling with the Haskris LX2 Water Recirculator

The Haskris LX2 closed-circuit water recirculator fulfills the sealed-tube X-ray source's cooling water requirements.

Table 10. Haskris LX2 dimensions

Haskris LX2 Dimensions	
Height	68 cm (26½")
Width	36 cm (14")
Depth	77 cm (30")

Table 11. Haskris LX2 weight

Haskris LX2 Weight	
Shipping weight (reservoir empty)	Approx. 98 kg (215 lbs)
Filled weight	Approx. 103 kg (227 lbs)

Table 12. Haskris LX2 technical features

Haskris LX2 Technical Features	
Water-to-air cooling capacity	3400 W (11601 btu/hr)
Water-to-water cooling capacity	3800 W (12966 btu/hr)
Water pump capacity	13.2 l/min (3.5 gal/min)
Water reservoir volume	4.9 l (1.3 gal)
Temperature stability	±0.1° C (0.18° F)
Refrigerant	407C
Coolant required	Clean, potable, distilled water

Table 13. Condenser cooling water requirements (for water-to-water cooling)

Condenser Cooling Water Requirements (for water-to-water cooling)	
If water temperature is 18° C (65° F)...	...flow rate required is 4.9 l/min (1.3 gal/min)
If water temperature is 24° C (75° F)...	...flow rate required is 7.2 l/min (1.9 gal/min)
If water temperature is 29° C (85° F)...	...flow rate required is 11.0 l/min (2.9 gal/min)
Minimum required pressure differential from condenser water inlet to outlet	1.7 bar (25 psi)
Maximum allowable pressure differential from condenser water inlet to outlet	3.4 bar (50 psi)
Maximum condenser water inlet pressure	10.3 bar (150 psi)

Table 14. Location

Location	
Installation location	Must be installed in a clean, indoor environment. If possible, install the recirculator in a separate room to minimize noise and heat emission.
Accessibility	The recirculator is moveable on casters. We recommend access to: <ul style="list-style-type: none"> <li>■ the FRONT for visibility of controls and readouts; and</li> <li>■ BOTH SIDES for convenient servicing should a spare part be required.</li> </ul>

Figure 7. Haskris model LX2 technical specifications diagram

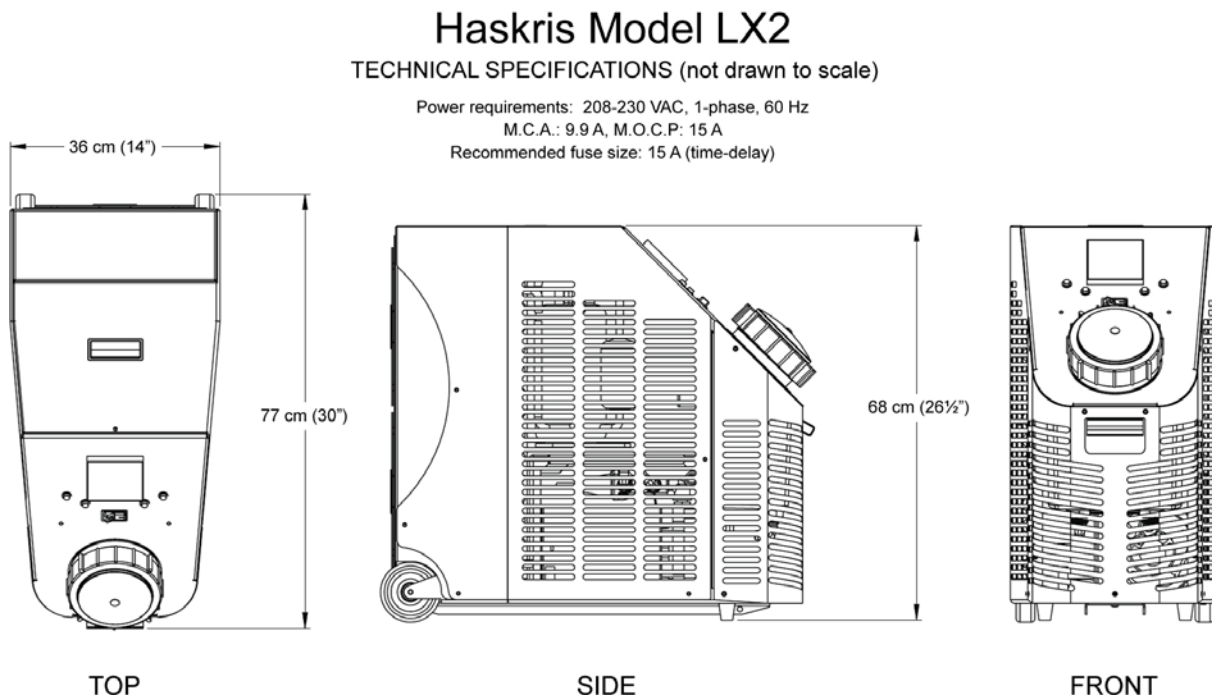
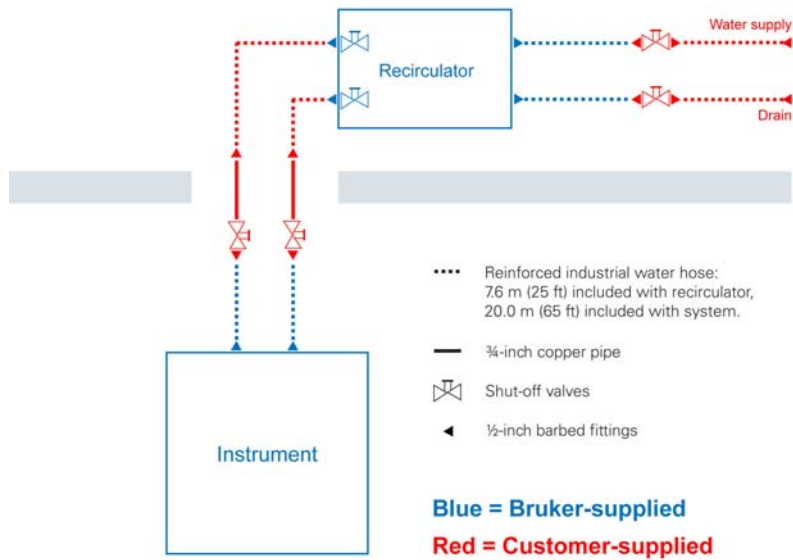


Figure 8. Haskris LX2 connections diagram



## Helium or Nitrogen Supply (Optional)

- For equipment with a helium or nitrogen flush option (required for liquid or loose powder analysis), install a helium or nitrogen cylinder with a two-stage regulator as noted in Table 15.
- Secure the cylinder with a mounting support to avoid accidental tipping.

Table 15. Helium specifications

Gas	Cylinder/Regulator (not factory-supplied)
Helium or nitrogen	Compressed-gas cylinder with T-size cylinder filling pressure, 2900 psi (180 bar), with regulator such as AGA model SGVHPT270B-580 or equivalent.

## Final Check

You, the customer, are responsible for meeting all applicable building and safety codes. Once the pre-installation utilities are connected, get certification from an approved authority that the installation meets all applicable building and safety codes.

When all pre-installation work is finished, contact the Bruker Service Department by telephone to confirm that your site is ready for installation.

Upon receiving confirmation that your site is ready, Bruker personnel will schedule the instrument installation.

## When the System Arrives

- When the system arrives, check it for damage with the delivery driver. Contact the carrier's office and Bruker immediately if you find any damage. Check the tip and shock indicators (if present).
- Compare the packing list (i.e., the number of boxes received) with your order invoice, and contact Bruker if you find any discrepancies.
- Move boxes or crates to the installation site (if possible) to facilitate timely installation. Wait until a Bruker Field Service Engineer opens the boxes to check their contents against your invoice. Do not open or uncrate any boxes.
- If uncrating is required, call Bruker for authorization. If you are authorized to uncrate the shipment, save all packing material until the Bruker Field Service Engineer completes the installation.
- Installation must be performed by a Bruker Field Service Engineer.
- Save all of the system's packing materials until the Bruker Field Service Engineer has completed the installation.

## North American Service Center Contact Information

Table 16. Bruker AXS North American Service Center contact information

Bruker AXS North American Service Center	
Address:	Bruker AXS Inc. Customer Support 5465 East Cheryl Parkway Madison, WI 53711-5373 USA
Toll-free telephone:	1 (800) 234-XRAY [9729]
Direct line:	1 (608) 276-3000
Fax:	1 (608) 276-9162
E-mail:	Customer.Service@bruker-axs.com
Web:	<a href="http://www.bruker-axs.com">http://www.bruker-axs.com</a>

# D8 ADVANCE Pre-installation Checklist

Please complete the Checklist below, and fax it to the Bruker Service Department:

**TO:**

Bruker AXS Attn: Service Department, 1 (608) 276-9162 or 1 (608) 276-3015

**FROM:**

Contact Name \_\_\_\_\_

Phone \_\_\_\_\_

Company/Organization \_\_\_\_\_

Fax \_\_\_\_\_

Email \_\_\_\_\_

Component		YES/ NO	Value/Remark	Initial/Date
Room Location	Floor load capacity exceeds 1300 kg/m <sup>2</sup> (266.3 lbs/ft <sup>2</sup> )			
	Room height exceeds 73.5" (186.8 cm)			
	Floor space for D8 ADVANCE free of equipment and clean			
	Doors and hallways from loading dock to location have adequate clearance for moving the D8 ADVANCE in its shipping crates; freight elevator available			
	If the assembled system (with its enclosure rear and side panels removed) needs to be moved, a doorway with a width of 91.4 cm (36.0") is available.			
	Clearance on all sides of uncrated unit exceeds 70.0 cm (27.6")			
	Computer table within 4.0 m (13.0') of instrument			

Component		YES/ NO	Value/Remark	Initial/Date
Environment	System is not exposed to direct sunlight			
	Ambient temperature: Maximum: 15.0° - 35.0° C (59.0° - 95.0° F) Recommended: 20.0° - 28.0° C (68.0° - 82.4° F)			
	Temperature gradient less than 1.0° C (1.8° F) per hour			
	Heat removal capacity exceeds 1.0 kW (3412 btu/hr)			
	Relative humidity between 20% - 80%, no condensation			
	Carpeted rooms: anti-static carpeting or mats installed			
Communications	Telephone line			
	Network connection			
Electrical Power	208-240 VAC, 50/60 Hz, 1-phase, 40 A fuses/breakers (D8 ADVANCE)			
	208-230 VAC, 60 Hz, 1-phase, 15 A fuse/breaker (Haskris LX2)			
	110-220 VAC, 50/60 Hz, 1-phase, 15 A fuse/breaker (Computer and peripherals)			
	All electrical power for the system must be isolated from circuits that have high starting currents (e.g., air conditioners, pumps, furnaces)			
	Electrical connection of instrument to mains power supply is provided with automatic circuit breakers for all phases			
	It is possible to disconnect the D8 ADVANCE completely from the mains power supply, using either a labeled switch or a circuit breaker located near the system			
	Power cable connected directly to switch box			



Component		YES/ NO	Value/Remark	Initial/Date
Cooling Requirements	Closed cooling system (Haskris LX2 recommended)			
	Plumbing/piping complete (for Haskris LX2)			
	Customer-supplied cooling system (not recommended)			
The Haskris LX2 water recirculator meets the system's cooling water requirements. If you provide your own water supply, it must meet the following requirements:				
Customer-supplied cooling system (if used)	Flow rate greater than 3.6 l/min (1.0 gal/min). Recommended rate: 4.0 l/min (1.1 gal/min) or higher.			
	Pressure 4 - 7.5 bar (60 - 110 psi) and pressure-free drain			
	Temperature 15 - 20° C (59 - 68° F). Room temperature must be high enough to avoid condensation.			
Bruker recommends the use of distilled or reverse osmosis (RO) water for cooling the X-ray tube and generator. <b>Use of deionized water is NOT recommended.</b> If building water is used, it must meet the following requirements:				
Building water (if used)	Hardness less than: <ul style="list-style-type: none"> <li>■ 300 mg/L CaO, or</li> <li>■ 30° CaO (German scale), or</li> <li>■ 53.7° CaO (French scale), or</li> <li>■ 37.5° CaO (UK scale)</li> </ul>			
	pH of 7.0 ± 1			
	Adequate filtering to remove suspended solids (~ 50 µm)			
Plumbing Requirements	Distance to water supply less than 15 m (48') if Haskris used			
	Shutoff valves installed on both lines (not required if discharging into drain)			
	Elevation difference between Haskris and instrument less than 6 m (20')			
	NW ½" hose barb fittings for supply and return of cooling water			

Component		YES/ NO	Value/Remark	Initial/Date
Helium or nitrogen gas (if applicable)	Non-factory-supplied cylinder/regulator securely mounted to wall within 2 m (6') of the D8 ADVANCE			
	If mounted farther away than the supplied hose length, correct tubing/piping line installed			
Vacuum	Exhaust to outside (optional)			
Final Check	All local safety codes are met			
	Fax a copy of this form to: Bruker AXS, Attention: Service Department 1 (608) 276-9162			
	Call for installation: 1 (800) 234-XRAY [9729] extension 3087			

When the system arrives: Check the packing crates for shipping damage. If there is damage, contact Bruker and your carrier's office. Compare the packing list (i.e., the number of boxes/crates) with your invoice. If possible, move the boxes and/or crates to the installation site or storage area. Do not open the crates or boxes. If uncrating is required, call Bruker for authorization at 1 (800) 234-XRAY [9729] extension 3087. If you are authorized to uncrate the shipment, save all packing materials until the Bruker Field Service Engineer completes installation.

**Bruker Corporation**

40 Manning Road  
Billerica, MA USA  
  
Phone +1 (978) 663-3660  
Fax: +1 (978) 667-5993  
  
E-mail: info@bruker.com  
www.bruker.com

● **Bruker AXS Inc.**

5465 East Cheryl Parkway  
Madison, WI 53711-5373 USA  
  
Phone +1 (800) 234-XRAY [9729]  
Fax +1 (608) 276-3006  
  
E-mail: info@bruker-axs.com  
www.bruker-axs.com

