# ACQUITY UPLC H-Class Series and H-Class Bio Series Systems

**Site Preparation Guide** 

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#### **General information**

This guide helps you prepare your laboratory facility for installation of the Waters ACQUITY™ UltraPerformance (UPLC™) system configurations listed below. Proper site preparation is critical to successful operation of the system.

- ACQUITY UPLC H-Class Series with Binary Solvent Manager (BSM)
- ACQUITY UPLC H-Class Series with Quaternary Solvent Manager (QSM)
- ACQUITY UPLC H-Class Bio Series with QSM

#### Notes:

- References to the H-Class and H-Class Bio Systems (including instruments) also pertain to the ACQUITY UPLC H-Class Series and H-Class Bio Series Systems (including instruments).
- References to the SM-FTN also pertain to the SM-FTN PLUS.
- References to the BSM also pertain to the BSM PLUS.
- References to the QSM also pertain to the QSM PLUS.

#### Related information

- ACQUITY UPLC H-Class Series System user guides
- ACQUITY UPLC H-Class Bio Series System user guides
- Mass spectrometer (MS) system user guides (www.waters.com)

#### **Customer support**

If you have questions about this document or preparing your site, contact your local Waters sales representative.

#### Safety advisories



**Warning:** Failure to completely read and explicitly follow the site preparation guide may result in damage to the products, injury to persons, and damage to other property.



Warning: To avoid personal contamination and eye injury, wear clean, chemical-resistant, powder-free gloves and use eye protection when performing this procedure.



**Warning:** Observe Good Laboratory Practice (GLP) at all times, particularly when working with hazardous materials. Consult the Safety Data Sheets (SDS) regarding the solvents you use. Additionally, consult the safety representative for your organization regarding its protocols for handling such materials, and refer to <a href="Controlling Contamination in LC/MS Systems">Contamination in LC/MS Systems</a> (715001307).

# **Glossary of abbreviations**

Table 1 gives a glossary of product name abbreviations.

**Table 1: Glossary of abbreviations** 

Abbreviation	Component name
30-cm CHC	ACQUITY UPLC 30-cm Column Heater/Cooler
3465	3465 Electrochemical Detector
BSM	ACQUITY UPLC Binary Solvent Manager
CH-30A	ACQUITY UPLC 30-cm Column Heater – Active
CH-A	Column Heater – Active
CM-A	ACQUITY UPLC Column Manager – Active
ELS	ACQUITY UPLC Evaporative Light Scattering Detector
FLR	ACQUITY UPLC Fluorescence Detector
MS	Mass spectrometer
PDA	ACQUITY UPLC Photodiode Array Detector or Extended wavelength (eλ or eLambda) Photodiode Array Detector
QDa	ACQUITY QDa Detector
QSM	Quaternary Solvent Manager
RI	ACQUITY UPLC Refractive Index Detector
SM-FTN	ACQUITY UPLC Sample Manager – Flow-through-needle
SO	ACQUITY UPLC Sample Organizer
SQD 2	Single Quadrupole Detector 2
TQD	Triple Quadrupole Detector
TUV	ACQUITY UPLC Tunable UV Detector
UPLC	ACUITY UltraPerformance Liquid Chromatography
WFM-A	Waters Fraction Manager – Analytical

# Responsibilities

The customer must prepare the site as required before the Waters-certified engineer can install the system.

#### Customer responsibilities (storage and site preparation)

Notice: It is essential to prepare the site correctly and complete the checklist accurately. If a Waters field service engineer (FSE) arrives on site to begin your installation and cannot proceed because of inadequate site preparation or lack of necessary supplies, you may be charged for all travel costs incurred.

Please contact Waters if you have questions about preparing your site.

- 1. Provide appropriate storage for Waters equipment before it is installed.
- 2. Prepare your laboratory to meet the requirements specified in the site preparation guide.
- 3. Verify that each requirement has been met by ticking the check box in each section.

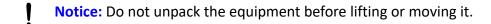
**Note:** If the designated person cannot be present at the installation, please notify Waters so that we can reschedule for a more convenient time.

4. Ensure that the person designated to operate and maintain the system is present at the installation for training in basic system operation.

#### Waters responsibilities (installation)

- 1. Unpack the system.
- 2. Install the system.
- 3. Test system performance to ensure that it is properly installed and operational.

## **Relocating shipping containers**



Follow the guidelines in this section to lift, relocate, and store shipping containers.

#### Lifting



**Warning:** To avoid injury, use appropriate lifting equipment to lift the mass spectrometer. Do not lift it manually.



**Warning:** To avoid injury, at least two people (or suitable lifting equipment) must lift any instrument that weighs more than 39.68 lb (18 kg).

**Notice:** If your system includes a mass spectrometer, refer to the appropriate site preparation guide for additional lifting requirements.

As a general guide before lifting, lowering, or moving the shipping containers:

- Assess the risk of injury
- Take action to eliminate risk
- Plan the operation ahead of the installation, and in conjunction with the Waters engineer at the time of installation
- Adhere to appropriate country and company regulations

#### Moving



**Caution:** To avoid damaging the system, do not bump or jolt it during transport. If you must transport the instrument across an uneven surface, carry it on a forklift truck or trolley.

If you move the shipping containers, transport them to the laboratory designated for system use. Follow these guidelines:

- Ensure that all passageways accommodate the largest component.
- Keep shipping containers on the pallet. If you find it necessary to transport shipping
  containers individually (that is, without the pallet), be sure to move all containers, and
  retain all packing slips.

#### **Doorways**

Doorways must be a minimum width to accommodate the largest component. For system dimensions, see Tables 2 and 4.

Elevators, corridors, and staircases

Notice: For safety reasons, Waters is not responsible for moving products via staircases.

Elevators and corridors must be wide enough to allow corners to be negotiated. If you plan to move the system via staircase, you are responsible for moving the system.

#### Storage

Ensure the following storage conditions before Waters installs your system:

- Unopened shipping crates
- Storage area temperature 0 to 40 °C (32 to 104 °F)
- Humidity (<) 80%, non-condensing</li>

#### **Verify relocating shipping containers requirements**

Notice: Installation cannot proceed unless all site preparation requirements have been met.

Check the box below to verify that all requirements have been met. After completing all check boxes, return the site preparation guide to Waters.

All relocation requirements are met

## Space and load requirements

Ensure that the laboratory bench has sufficient space for system configuration and installation, and can support the weight of all components.

## **Recommended configurations**

**Notice:** If you do not know which layout to prepare for, contact your Waters representative.

The following figures show recommended layouts for your system as configured in a single or double stack. It is allowable to have more than two stacks, depending on the needs dictated by the modules in your system.

This layout is an example only. For configuration information specific to your system, contact your Waters representative.

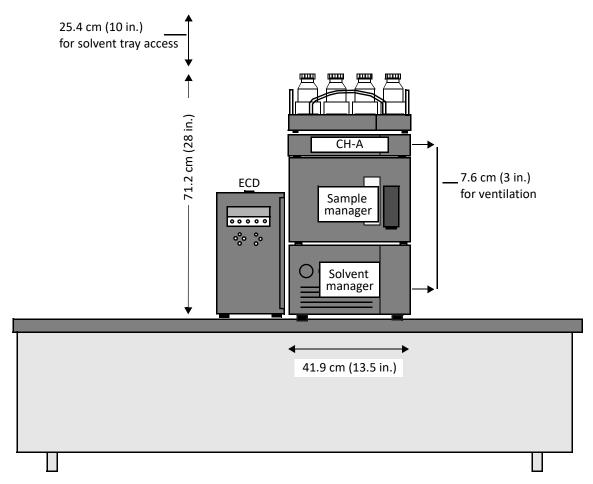


Figure 1 - Example configuration with CH-A and 3465 ECD (front view)

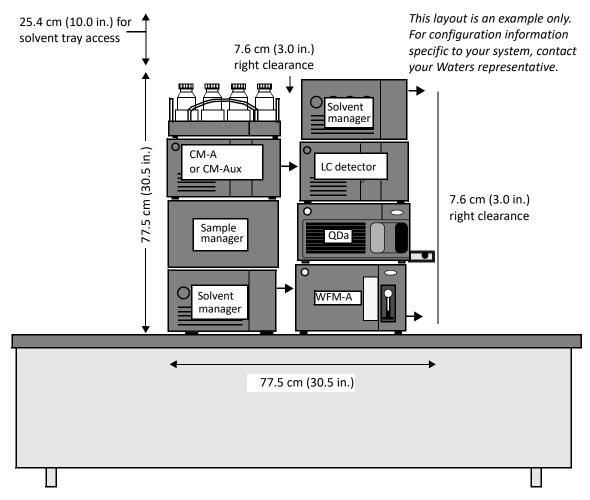


Figure 2 – Example configuration with two stacks (front view)

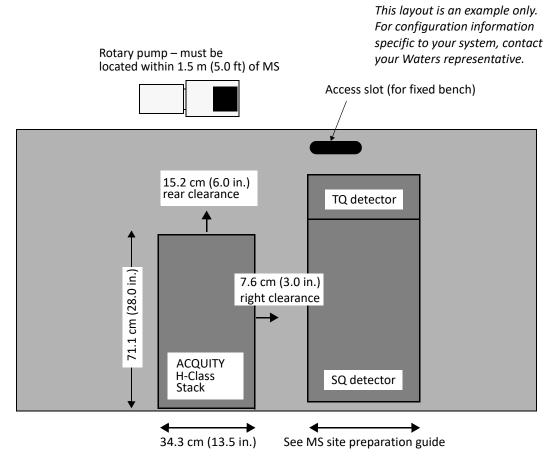


Figure 3 – Example configuration with MS (top view)

#### **Component dimensions**

Make sure your laboratory bench has sufficient space for and can support the weight of all system components (see Table 2).

- Requirement: To determine the benchtop width required to accommodate the installation of your H-Class or H-Class Bio System, be aware that no stack can exceed one meter (39.4 in.) in height. Depending on the modules in your system, you may need to configure the modules in one, two, or more stacks. Contact your Waters representative with any questions.
- Notice: Ensure there is at least 152 cm (5.0 ft) of vertical clearance above the laboratory bench.
- Notice: For specific height and weight restrictions, contact your Waters service representative.

**Notice:** For MS requirements, refer to the appropriate mass spectrometer site preparation guide.

**Table 2: Component dimensions and weights** 

System component	Width	Depth	Height	Weight
30-cm CHC	15.2 cm (6.0 in.)	54.3 cm (21.4 in.) <sup>a</sup> 58.1 cm (22.9 in.) <sup>b</sup>	57.1 cm (22.5 in.)	12.7 kg (28 lb)
3465	22.1 cm (8.7 in.)	42.9 cm (16.9 in.)	43.9 cm (17.3 in.)	14.5 kg (32 lbs)
BSM	34.3 cm (13.5 in.)	66.1 cm (26.0 in.)	23.8 cm (9.38 in.)	26.3 kg (58 lb)
CH-30A	34.3 cm (13.5 in.)	14.8 cm (5.8 in.) 18.6 cm (7.3 in.) <sup>b</sup>	7.6 cm (3.0 in.)	5.7 kg (12.5 lb)
CH-A	34.3 cm (13.5 in.)	62.9.0 cm (24.8 in.)	7.6 cm (3.0 in.)	5.7 kg (12.5 lb)
CM-A	34.3 cm (13.5 in.)	61.0 cm (24.0 in.)	19.9 cm (7.8 in.)	20.9 kg (46 lb)
ELS	34.3 cm (13.5 in.)	51.8 cm (20.4 in.)	21.6 cm (8.5 in.)	14.7 kg (32.5 lb)
FLR	34.3 cm (13.5 in.)	50.8 cm (20.0 in.)	21.6 cm (8.5 in.)	13.61 kg (30.0 lb)
MS	Refer to the appropria	ate MS site preparation	guide.	
PDA	34.3 cm (13.5 in.)	60.7 cm (23.9 in.)	19.4 cm (7.6 in.)	13.6 kg (30.0 lb)
QDa	Refer to the QDa Dete	ector Site Preparation G	uide (715002299).	
QSM	34.3 cm (13.5 in.)	66.0 cm (26.0 in.)	22.9 cm (9.0 in.)	27.7 kg (61.0 lb)
RI	34.3 cm (13.5 in.)	61.0 cm (24.0 in.)	20.8 cm (8.2 in.)	34 lb (15.4 kg)
SM-FTN	34.3 cm (13.5 in.)	71.1 cm (28.0 in.)	27.3 cm (10.8 in.)	25.9 kg (57 lb)
SO	25.4 cm (10.0 in.)	72.2 cm (30.0 in.) (model 186015021)	96.5 cm (38.0 in.) <sup>c</sup>	63.5 kg (140.0 lb)
50		68.0 cm (26.75 in.) (model 186015020)		
Solvent tray <sup>d</sup>	34.3 cm (13.5 in.)	52.1 cm (20.5 in.)	12.7 cm (5.0 in.)	2.3 kg (5.0 lb)
SQD 2	35.2 cm (13.9 in.)	74.0 cm (29.0 in.)	59.3 cm (23.2 in.)	80 kg (176.0 lb)
TQD	35.6 cm (14.0 in.)	85.1 cm (33.5 in.)	53.4 cm (21.0 in.)	85.5 kg (189.0 lb)
TUV	34.3 cm (13.5 in.)	53.4 cm (21.0 in.)	20.8 cm (8.2 in.)	9.3 kg (20.5 lb)
WFM-A	34.3 cm (13.5 in.)	71.1 cm (28.0 in.)	27.3 cm (10.75 in.)	20.4 kg (45.0 lb)

a. Without drip tray fitting.

b. For modules that include the optional Column Module Switch Box (and without drip tray fitting for the 30-cm CH/C).

c. Including base.

d. Top-mounted.

# Optional flex cart dimensions

**Table 3: Flex cart dimensions** 

Width	76.1 cm (30.0 in.)
Depth	83.8 cm (33.0 in.)
Minimum table height	76.1 cm (30.0 in.)
Maximum table height	111.8 cm (44.0 in.)
Height adjustment	35.6 cm (14.0 in.)
Cart weight	77.3 kg (170.0 lb)
Supportable weight	181.8 kg (400.0 lb)

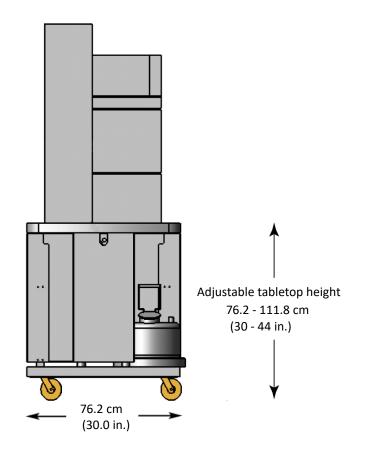


Figure 4 – ACQUITY system flex cart

#### Clearances

- Notice: Configure your ACQUITY system so that the highest point of the topmost module (for example, the rails of the solvent bottle tray) is no higher than one meter (39.37 inches) above the bench top. Do not include the solvent reservoir bottles in the measurement.
- Notice: For MS requirements, refer to the appropriate mass spectrometer site preparation guide.

Ensure the laboratory space provides sufficient clearance (working space) for all necessary components.

System/componentClearanceCustomer's laboratory benchVertical: 152 cm (5.0 ft)System componentsRear: 15.2 cm (6.0 in.)Note: Refer to the appropriate MS site preparation guide for additional requirements.Right: 7.6 cm (3.0 in.)Solvent tray (top-mounted)Vertical: 25.4 cm (10.0 in.)

**Table 4: System clearances** 

### **Verify space and load requirements**

Notice: Installation cannot proceed unless all site preparation requirements have been met.

All space and load requirements are met

## **Solvent requirements**



**Caution:** To ensure proper performance of the LC/MS system, use clean, high-purity (LC/MS-grade) solvents. Failure to provide clean solvents and glassware can cause significant delays to the installation.

Notice: For MS requirements, refer to the appropriate mass spectrometer site preparation guide.

Have the following solvents available for the installation:

- **Notice:** For details on solvent brands, glassware requirements, and procedures to control contamination, see:
  - Controlling Contamination in LC/MS Systems (715001307)
  - The <u>safety data sheets (SDSs)</u> for your products
- Water
- Acetonitrile
- Methanol
- Isopropanol (IPA)

#### **Verify solvent requirements**

Notice: Installation cannot proceed unless all site preparation requirements have been met.



## **Gas requirements**

#### Gas for the mass spectrometer

Notice: For complete information on mass spectrometer gas requirements, refer to the appropriate site preparation guide.

#### Gas for the ELS detector

Air or nitrogen

The ELS detector requires:

- A suitable supply of nitrogen gas or zero-grade air
- A gas flow of approximately 3 to 4 L/min
- A constant gas supply (65 to 100 psi at the regulator)

#### Air/gas quality

**Notes:** Gas cylinders are not recommended because of their limited capacity. Ensure these conditions:

Air/gas quality should meet the highest possible standards for particle diameter, moisture, and oil density.

#### **Verify gas requirements**

Notice: Installation cannot proceed unless all site preparation requirements have been met.



## **Power requirements**

Refer to the following power requirements when preparing your laboratory.

#### **Electrical safety**

Follow all local electrical safety requirements in preparing your laboratory.

#### **Over-voltage rating**

The laboratory environment must comply with installation (over-voltage) category II.

#### Power source/receptacles

All system components require a dedicated, earthed (grounded) power source. The receptacles from this power source must be accessible to the system components, and must share a common ground. Use Table 6 as a guide for determining the receptacles required for the components in your system.

## Optional valves

If your system includes optional valves, be aware that each valve includes a power supply that requires a power receptacle that uses a common, earthed (grounded) power source.

#### Systems with a mass spectrometer

If your system includes an MS, refer to its site preparation guide for specific power source requirements.

#### **Power summary**



**Caution:** Never use an extension cord to connect the instrument to an AC power source.

Table 5 provides a summary of component power requirements. For more information on power terminology, see Plug/receptacle types, page 17.

**Table 5: System power requirements** 

Component	Nominal rated voltage	Maximum power consumption
2432		160 VA
3465		260 VA
30-cm CH		50 W
30-cm CHC		240 VA
BSM		360 VA
CH-A		N/A
CH-30A		50 W
CM-A		400 VA
CM-Aux	100 to 240 VAC	400 VA
ELS	50/60 Hz	200 VA
FLR		280 VA
PDA		145 VA
QDa		400 VA
QSM		200 VA
RI		145 VA
SM-FTN		400 VA
SO		540 VA
TUV		185 VA
WFM-A	90 to 264 VAC 47/63 Hz	400 VA
MS	Refer to the appropriate N	MS site preparation guide.

## Plug/receptacle types

- **Requirement:** Ensure that one receptacle is available for each system component (including the data system).
- **Notice:** If you are uncertain which power cord is supplied for your region, contact your Waters representative.

Table 6 shows the appropriate wall receptacles for the plug(s) that come with your system.

Region Receptacle Receptacle type Plug US/Canada **NEMA 5-15R** UK BS 1363 CEE 7 Europe Australia AS/NZS 3112 Brazil NBR 14136 China CPCS-CCC Denmark 107-2-D1 Switzerland SEV 1011

**Table 6: Power cords supplied by Waters** 

#### **Verify power requirements**

**Notice:** Installation cannot proceed unless all site preparation requirements have been met.

All power requirements are met
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## **Environmental requirements**

#### Air quality

1

**Notice:** The laboratory environment must comply with UL™ Pollution Degree 2.

Ensure that the laboratory is not exposed to excessive dust.

#### **Humidity**

Ensure relative humidity of the laboratory is lower than (<) 80%, non-condensing.

#### Air flow

Ensure that air flow from heating or air-conditioning diffusers is not directed on the system.

#### **Temperature**



**Caution:** Failure to operate in this range will compromise system performance and can result in instrument failure.

**Notes:** The optimum temperature range of the laboratory is from 19 to 22 °C (66 to 72 °F).

The ambient temperature in the laboratory must be from 15 to 28 °C (59 to 82 °F). Short-term thermal variations should be no more than 2 °C (3.6 °F) per 1.5 hours.

#### Column heater



**Caution:** The CM-A is designed to accurately control the column temperature when the difference between the room and column temperatures is at least 5 °C (9 °F).



**Caution:** If the ambient temperature equals or exceeds 25 °C (77 °F), sample cooling in the CM-A will not reach 4 °C (39.2 °F).

#### Mass spectrometer



**Notice:** If your system includes a mass spectrometer, refer to its site preparation guide for specific information on thermal variations.

#### **Vibration**

Ensure the laboratory is located away from heavy machines such as compressors and generators, which can create excessive floor vibration.

#### Magnetic fields

If using the system with a mass spectrometer, ensure the laboratory is located away from strong magnetic fields such as those generated by NMR systems or magnetic sector mass spectrometers.

#### **Radio emissions**



**Caution:** If use of any of these devices causes interference, discontinue using the interfering device.

Minimize radio frequency (RF) emission from surrounding sources. Possible sources of RF emission include RF-linked alarm systems, mobile telephones, and hand-held transmitters.

#### **Verify environmental requirements**



**Notice:** Installation cannot proceed unless all site preparation requirements have been met.



## Waste collection requirements

1

**Notice:** To maintain proper drainage and leak control, ensure the system is level.

The drip management system is a closed-architecture, gravity-driven drainage system that effectively collects and removes any solvent leaks and process waste from the needle and plunger seal washes. Each instrument uses a drip tray to collect and route the waste from one module tray to the one beneath it.

#### Waste container

Position a suitable waste container below the bench top.

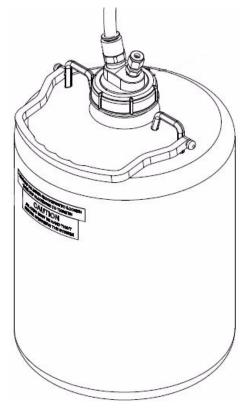


Figure 5 – Example waste container

## **Exhaust outlets**



**Notice:** Venting of the system is the sole responsibility of the customer.

An in-line degasser, integral to the solvent manager, exhausts dissolved gases from the eluents and condensate from the exhaust system through a vent line on the front of the instrument. To avoid exposure to solvent vapors, it is recommended that you route the exhaust to a laboratory fume hood.

#### Exhaust outlet for systems with an ELS detector

If your system includes an ELS detector, a drying gas exhaust bottle is provided to trap any condensate that forms from vented vapor exiting the detector. A 3-ft (0.9-m) and 5-ft (1.5-m) length of black exhaust hose is also supplied to route exhaust from the detector to the bottle, and from the bottle to a laboratory exhaust system.

For complete ELS exhaust requirements, see the <u>ACQUITY UPLC Evaporative Light Scattering</u> <u>Detector Getting Started Guide</u> (71500109303).

#### Exhaust outlet for systems with a mass spectrometer

If your system includes an MS, refer to its site preparation guide for detailed pump and source exhaust outlet information.

## Verify waste collection requirements

Notice: Installation cannot proceed unless all site preparation requirements have been met.

	All waste collection requirements are met
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## **Test sample requirements**

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**Notice:** Please contact Waters if you have questions about providing test samples.

**Notes:** If your laboratory practices require full sample certification documentation, Waters Analytical Standards and Reagents provide ready-to-use reference materials and reagents that are fully traceable and certified.

The Waters service engineer uses the samples supplied with the system. If the test samples were received in a separate shipment, you must make the samples available to the Waters engineer at the time of installation. If a Waters service engineer arrives on site to begin your installation and cannot proceed because test samples are unavailable, the installation may be delayed. Waters may ask for reimbursement of costs incurred by the extra time required to complete the installation.

#### Verify test sample requirements



**Notice:** Installation cannot proceed unless all site preparation requirements have been met.



## Items you must supply



Caution: Ensure that supplied items have never been washed with detergent, washed with other glassware, or washed in facilities that might have detergent residue. Washing glassware in a common dishwashing facility can contaminate glassware with detergent residues, which may contain polyethylene glycol and other "sticky" substances. Vinyl-coated steel racks can be additional sources of contamination.

**Notice:** If your system includes a mass spectrometer, refer to the mass spectrometer site preparation guide for other required items.

Supply the following items for the installation:

- Bottles, mobile phase, 1-L (4) or 2-L (2)
- Bottles, reservoir, 1-L (3)
- Cylinder, graduated, 100-mL
- Flask, volumetric, 100-mL
- Gloves, nitrile
- Pipettes, calibrated
- Solvents
- Filtration apparatus, solvent (if applicable)
- Tissue, lint-free
- Vials, sample
- Test samples, Waters-supplied
- Waste container, non-glass (that can be vented to an exhaust system)
- Waters RI Detector Qualification Mobile Phase (700002419 for RI only)

#### Verify items you must supply requirements

Notice: Installation cannot proceed unless all site preparation requirements have been met.

All items we (the customer) must supply are available

## **Computer requirements**

**Important:** Refer to your system's <u>release notes</u> for additional information and restrictions. Release notes contain important information about known and fixed issues, installation, and configuration instructions, and recommendations for requalification or re-validation.

If you are providing your own computer for a Waters chromatography data system, contact your Waters sales representative for details on the required computer, software, and operating system specifications.

#### Verify computer requirements

**Notice:** Installation cannot proceed unless all site preparation requirements have been met.

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## **Confirmation**

**Important:** It is essential to prepare the site correctly and complete the checklist accurately. If a Waters service engineer arrives on site to begin your installation and cannot proceed because of inadequate site preparation or lack of necessary supplies, you may be charged for all travel costs incurred.

Please contact Waters if you have questions about preparing your site.

	I confirm that all supplies are now available.
	I confirm that all requirements have been met and all Requirement check boxes have been completed. (See list of check box items below.)
	1. All relocation requirements are met, page 7
	2. All space and load requirements are met, page 13
	3. All solvent requirements are met, page 14
	4. All gas requirements are met, page 15
	5. All power requirements are met, page 18
	6. All environmental requirements are met, page 20
	7. All waste collection requirements are met, page 22
	8. All test sample requirements are met, page 23
	9. All items we (the customer) must supply are available, page 24
	10. All computer requirements are met, page 25
	I confirm that an operator will be available for demonstration and training by a Waters FSE during the installation.
	Indicate availability (check one):
	During the entire installation
	<ul> <li>During part of the installation: approximately% of the time</li> </ul>
	<b>Requirement:</b> If the designated person cannot be present at the installation, please notify Waters so that we can reschedule the installation for a more convenient time.
Signe	<del>'</del> d:

# **Summary**

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**Notice:** The installation of your system cannot begin until the site preparation guide has been fully completed and returned to your local Waters representative.

Please complete the summary table below in block letters.

Job title	
Name	
Organization	
Street	
City/state	
Zip/postal code	
Country	
Telephone	
Fax	
Email	