
CESI 8000 Plus High Performance Separation-ESI Module

Site Planning Guide



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Introduction

1

This guide is for the site planner, the individual responsible for preparing the facility for the installation of the system.

Note: Refer to the *Safety Manual* for instructions for safe use of the system.

Customer Site Planner Responsibilities

Complete the [Site Planning Checklist](#) in consultation with facilities services personnel (electrical, ventilation, and information technology [IT]), and return it to the SCIEX field service employee (FSE) before the completion date. Refer to [Signoff](#).

Note: The FSE will follow up if the checklist is not received prior to the scheduled installation date.

- Verify that adequate space and the required shipping or receiving facilities are available. Refer to [Site Layout](#).
- Provide all required electrical receptacles. Refer to [Electrical Requirements](#).
- Verify that the requirements for ventilation and waste collection are met. Refer to [Ventilation and Waste Collection Requirements](#).
- Verify that the requirements for the operating environment are met. Refer to [Environmental Requirements](#).
- Verify that the requirements for the computer and network are met. Refer to [Computer, Software, and Network Requirements](#).
- Verify that all required solutions and laboratory supplies are available. Refer to [Customer-Supplied Solutions and Equipment](#).
- Verify that up to two operators have been identified for training. Refer to [Customer Preparation Requirements](#).

Introduction

- For installations where the CESI 8000 Plus System will be used with a mass spectrometer:
 - Verify the mass spectrometer to be used with the system is operational by executing a performance test.
 - Verify that any required additional equipment for the ion source or mass spectrometer is present.
 - Verify that someone who knows how to operate the mass spectrometer will be available during the installation.Refer to [Mass Spectrometer Requirements \(CESI-MS Systems Only\)](#).
- When the shipment arrives, inspect the packaging exterior for damage. If there is any damage, then note any issues on the delivery receipt and notify SCIEX immediately.
- Contact SCIEX Customer Service or the local FSE to schedule the installation.

FSE Responsibilities

Note: If the site preparation tasks are not complete when the SCIEX Field Service Employee (FSE) arrives, then the scheduled installation will be postponed.

- Review the checklist and discuss any outstanding issues with the site planner.
- Unpack and set up the CE equipment.
- Verify the performance of the system.

During Installation



WARNING! Lifting Hazard. Make sure that at least four people or a lifting device are available to lift the CE system. Follow established safe lifting procedures. Refer to the *Site Planning Guide* for the weights of system components.

The FSE unpacks the system (with the assistance of customer staff), sets up the system, and then confirms its operation. When the system is installed, the FSE conducts an installation qualification.

Customer Familiarization

During installation, the FSE provides a system and software overview, reviews data, and provides some basic operator familiarization.

Technical Support

SCIEX and its representatives maintain a staff of fully-trained service and technical specialists located throughout the world. They can answer questions about the system or any technical issues that might arise. For more information, visit the SCIEX website at sciex.com.

Site Planning Checklist

2

Customer Information

Contact name			
Organization			
Address			
City			
State/Province/ Region		ZIP code/Postal code	
Country			
Telephone			
E-mail address			

Requirements

Site Layout

Refer to [Site Layout Requirements on page 15](#).

Requirements	Complete	N/A
There is adequate lab space to accommodate the equipment.		—
If the mass spectrometer inlet is lower or higher than the range of the CESI 8000 Plus cart, a table or stand of the appropriate height for the CESI 8000 Plus System is available.		—
Additional personnel or lifting equipment are available to help the FSE move the equipment. Four people are recommended.		—

Electrical Requirements

Refer to [Electrical Requirements on page 16](#).

Requirement	Complete	N/A
Installation of electrical supplies and fixtures complies with local regulations and safety standards.		—
One branch circuit is provided for the CE components. One AC mains supply outlet is required. Note: Do not use extension cords.		—
The mains supply voltage does not fluctuate more than $\pm 10\%$ from the nominal voltage.		—
The mains supply includes a correctly installed protective earth conductor.		—
A qualified electrician has determined the appropriate mains supply configuration based on the system electrical specifications. Refer to System Electrical Specifications .		—

Site Planning Checklist

Ventilation and Waste Collection Requirements

Refer to [Ventilation and Waste Collection Requirements on page 18](#).

Requirement	Complete	N/A
Ventilation of the laboratory environment in which the system will be used complies with local regulations and the air exchange rate is appropriate for the work performed.		—
Waste containers are available as required by local regulations.		—

Environmental Requirements

Refer to [Environmental Requirements on page 18](#).

Requirement	Complete	N/A
The altitude does not exceed 2000 m (6562 ft) above sea level.		—
Temperature and humidity requirements have been met.		—

BioSafety Requirements

Refer to [BioSafety Requirements on page 19](#).

Requirement	Complete	N/A
The site is not designated as BioSafety Level 3 (BSL-3) or BioSafety Level 4 (BSL-4).		—

Computer, Network, and Software Requirements

Refer to [Computer, Software, and Network Requirements on page 19](#).

Requirement	Complete	N/A
(For systems to be used with Empower™ Software) The required software and hardware from Waters is available.	<input type="radio"/>	<input type="radio"/>
(For systems to be used with Empower™ Software) Information about any computers associated with the Empower™ Software is recorded.	<input type="radio"/>	<input type="radio"/>

Requirement	Complete	N/A
(For systems to be used with Empower™ Software) The LAC/E acquisition server must have two free USB ports, one for the license key and one for the GPIB interface cable.	<input type="radio"/>	<input type="radio"/>
(For systems to be used with Empower™ Software) If two CESI 8000 Plus Systems are to be connected to one LAC/E module, the GPIB interface cable has been ordered from SCIEX.	<input type="radio"/>	<input type="radio"/>
(Optional) A network printer or a dedicated printer and necessary print drivers are available.	<input type="radio"/>	<input type="radio"/>
(Optional) An active, tested LAN connection is available.	<input type="radio"/>	<input type="radio"/>

Mass Spectrometer Requirements (CESI-MS Systems Only)

If the CESI 8000 Plus System will be used stand-alone, then select the check box and do not complete the following table.	
---	--

Refer to [Mass Spectrometer Requirements \(CESI-MS Systems Only\)](#) on page 22.

Requirement	Complete	N/A
A mass spectrometer will be available during the installation.		—
A performance test has been performed on the mass spectrometer and a printout of the results is attached.		—
Any required equipment for the ion source or mass spectrometer is available at the site.		—
A person knowledgeable in operating the mass spectrometer will be available during the installation.		—

Solutions and Equipment Requirements

Refer to [Customer-Supplied Solutions and Equipment](#) on page 20.

Requirement	Complete	N/A
All of the required solutions and bottles are available.		—

Site Planning Checklist

Customer Preparation

Refer to [Customer Preparation Requirements on page 21](#).

Requirement	Complete	N/A
Up to two customers have been identified for familiarization.		—

Mass Spectrometer Information

If the CESI 8000 Plus System will be used stand-alone, then select the check box and do not complete the following table.	<input type="checkbox"/>
---	--------------------------

Mass spectrometer manufacturer	
Mass spectrometer model	
Mass spectrometer serial number	
Software version	
Firmware version	
Ion source model	
Ion source serial number	

Customer Profile

(Optional) To allow the FSE to provide site-specific familiarization, enter the following information.

Number of operators		
Years of experience with mass spectrometry		
Years of experience with capillary electrophoresis		
Will the system be used with the Empower™ Software?	Yes <input type="radio"/>	No <input type="radio"/>

Site Planning Checklist

Will the system be used stand-alone?			Yes <input type="radio"/>	No <input type="radio"/>
If the system will be used stand-alone, which detectors will be used?				
PDA		LIF		UV
Applications to be performed				
(Optional) Other applications				

Comments and Exceptions

--

Signoff

Site planner contact name	
I acknowledge that all of the installation requirements, as specified in this document, have been met.	
Site planner signature	Completion date (yyyy-mm-dd)
FSE name	Return date (yyyy-mm-dd)
FSE e-mail	

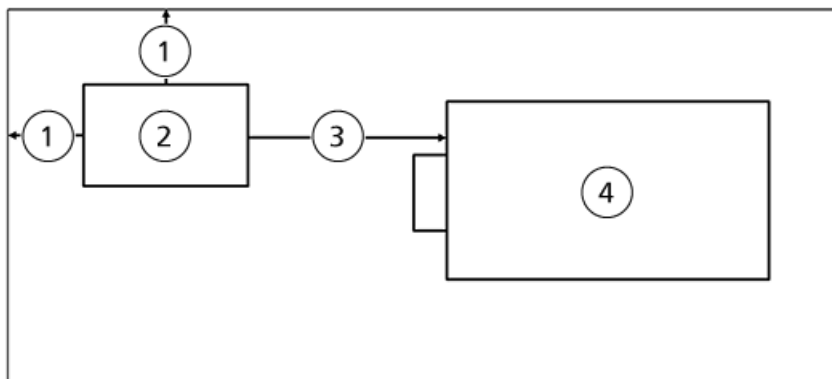
Site Layout Requirements

[Return to checklist.](#)

Laboratory Layout and Clearances

- The floor is smooth and level so that the mobile cart does not roll.
- The location allows at least 15.2 cm (6 inches) on all sides of the system.
- The location is away from heaters or cooling ducts, and not in direct sunlight.
- The location is away from vibrating equipment, such as refrigerators or centrifuges.
- For configurations where the CESI 8000 Plus controller is connected to the mass spectrometer acquisition computer with a 4.3 m (14 feet) cable, the maximum distance between the controller and the acquisition computer is 4 m (13 feet).

Figure A-1 Suggested Laboratory Layout



Item	Description
1	Distance to wall, minimum 15.2 cm (6 inches)
2	CESI 8000 Plus cart with controller and CESI 8000 Plus System

Site Requirements

Item	Description
3	Distance to mass spectrometer approximately 10.2 cm (4 inches) (determined at installation)
4	Mass spectrometer

Height Requirements (CESI-MS Systems Only)

The alignment mark on the outside of the CESI 8000 Plus System is 36 cm (14 inches) from the bottom of the system. This mark must be vertically aligned with the mass spectrometer inlet. To align the two systems, the height of the cart provided with the CESI 8000 Plus System is adjustable.

The cart can be used with mass spectrometers with inlets that are located between 105 cm (41 inches) and 148 cm (58 inches) from the floor. If the height of the inlet is outside of this range, the customer must provide a table or stand for the CESI 8000 Plus System.

Weights and Dimensions

Refer to the following table for weights and dimensions and make sure that the system can be moved to the installation site. Make sure that the installation site can accommodate the equipment dimensions, weight, and associated clearance.

Equipment	Height	Width	Depth	Weight
CESI 8000 Plus System	Cover open: 99.1 cm (39 inches) Cover closed: 73.1 cm (29 inches)	63.5 cm (25 inches)	72.4 cm (28.5 inches)	85.3 kg (188 lbs)
Rolling cart for CESI 8000 Plus System	66.6 cm to 111.8 cm (27 inches to 44 inches)	91.4 cm (36 inches)	73.7 cm (29 inches)	69.0 kg (152 lbs)

Electrical Requirements

[Return to checklist.](#)



WARNING! Electrical Shock Hazard. Use only qualified personnel for the installation of all of the electrical supplies and fixtures, and make sure that all of the installations adhere to local regulations and safety standards.

- Provide a branch circuit with an AC mains supply outlet for the cart.
- Provide a 20 A (minimum) circuit breaker for each system power connector.
- Do not use extension cords.

Mains Supply Connections



WARNING! Electrical Shock Hazard. Make sure that the system can be disconnected from the mains supply outlet in an emergency. Do not block the mains supply outlet.

Mains Supply Fluctuations

The CESI 8000 Plus System requires consistent voltage between 100 VAC to 240 VAC.

If the voltage changes more than 10% in 24 hours, then use a power conditioner. High or low voltages can adversely affect the electronic components of the equipment.

Protective Earth Conductor



WARNING! Electrical Shock Hazard. Do not intentionally interrupt the protective earth conductor. Any interruption of the protective earth conductor creates an electrical shock hazard.

The mains supply must include a correctly installed protective earth conductor. The protective earth conductor must be installed or inspected by a qualified electrician before the system is connected.

System Electrical Specifications

Note: Specifications are subject to change without notice.

Site Requirements

Table A-1 CESI 8000 Plus High Performance Separation-ESI Module Electrical Specifications

Specification	Value
Nominal input voltage	Instrument: 100 VAC to 240 VAC, auto-ranging Cart: 100 VAC to 240 VAC, auto-ranging Controller: 100 VAC to 240 VAC Monitor: 100 VAC to 240 VAC
Frequency	50 Hz or 60 Hz
Maximum input current	Instrument: 8 A Cart: 4.5 A Controller: 2.8 A Monitor: 1.5 A

Ventilation and Waste Collection Requirements

[Return to checklist.](#)

Ventilation Requirements

Refer to the "Laboratories" chapter in *ASHRAE, 2011 Handbook - HVAC Applications* for recommended laboratory ventilation guidance.

Waste Collection Requirements



WARNING! Biohazard or Toxic Chemical Hazard. Follow local directives when disposing of chemicals, vials and caps, and the remains of the prepared samples, if applicable. They might contain regulated compounds and biohazardous agents.

Environmental Requirements

[Return to checklist.](#)

- Altitude not exceeding 2000 m (6562 feet) above sea level
- An ambient temperature of 15 °C to 30 °C (59 °F to 86 °F)

- Relative humidity from 20% to 60%, non-condensing

BioSafety Requirements

The site must not be designated BioSafety Level 3 (BSL-3) or BioSafety Level 4 (BSL-4). SCIEX does not install, service, or repair SCIEX systems in areas designated BSL-3 or BSL-4.

Computer, Software, and Network Requirements

[Return to checklist.](#)

A computer (also referred to as a "controller") and monitor are supplied with the CESI 8000 Plus High Performance Separation-ESI Module unless the system is to be used with the Empower™ Software.

Refer to the *Site Planning Guide* for the mass spectrometer for detailed requirements for the mass spectrometer acquisition computer.

Controller Requirements

The controller and monitor are provided with the CE system.

CAUTION: Potential System Damage. Other than security software, do not install any additional software on the controller. Changes to the configured software could void the system warranty and cause the system to stop operating. All operators require read/write access to the C:\32Karat folder.

Printer Requirements

The system can be connected to a network or to a dedicated printer.

LAN Connection

The controller can be connected to the network. For systems using the Empower™ Software, the network requirements are dictated by the Empower™ Software configuration.

Requirements for Waters Empower™ Software Users

To use the system with Empower™ Software the following items are required:

- The LAC/E acquisition server must have a free USB port for the software license key.
- For every LAC/E module attached to the CESI 8000 Plus System, a free USB port for the interface cable.

Site Requirements

- Available from Waters:
 - Empower™ 3 Software (Feature Release 4).
 - 1 LAC/E module for each CESI 8000 Plus System.

Note: SCIEX recommends one computer for each CESI 8000 Plus System.

- Empower™ Software license
- If two CESI 8000 Plus Systems are to be connected to one LAC/E module, a GPIB interface cable is required. Refer to [Customer-Supplied Solutions and Equipment](#).

Empower™ Software Computer Configuration

If Empower™ Software is already installed at the site, indicate the configuration of any computers associated with the installation in the following table. This information can help with troubleshooting.

If the configuration is different than shown in [Computer Specifications for Empower™ Software](#), note any differences in [Comments and Exceptions](#).

Type of Computer	Configuration Details	Number at Site
Empower Personal Workstation or Client Computer, LAC/E ³² Module	Table C-1	
Empower Client Computer or LAC/E Module	Table C-2	
Empower Enterprise and Workgroup Server	Table C-3	
Citrix Server	Table C-4	
UNIX Server	Table C-5	
Linux Server	Table C-6	
Empower File Server	Table C-7	

Customer-Supplied Solutions and Equipment

[Return to checklist.](#)



WARNING! Toxic Chemical Hazard. Refer to the chemical product *Safety Data Sheets* and follow all of the recommended safety procedures when handling, storing, and disposing of chemicals. For health and safety precautions, refer to the *User Guide*.

For Empower™ Software Users

- If two CESI 8000 Plus Systems are to be connected to one LAC/E module, a GPIB interface cable is required (PN 970736).

General Equipment

- Appropriate personal protective equipment (PPE)
- Lint-free wipes
- Pipettors (2 µL, 10 µL, 20 µL, 100 µL or 200 µL, and 1 mL) and appropriate tips
- pH meter
- Benchtop centrifuge

Glassware and Consumables

- Glass bottles (20 mL, 100 mL)
- 20 mL glass vial
- 0.5 mL centrifuge tube
- 50 mL volumetric flask

Reagents

- Double-deionized (DDI) water (MS-grade water filtered through a 0.2 µm filter and with resistance above 18 MΩ)
- 1.0 N NaOH (Sigma PN 319511 or equivalent)
- 0.1 N HCl (Sigma PN 84428 or equivalent)
- 0.1 N NaOH (SCIEX PN 338424 or equivalent)
- 7.5 M ammonium acetate (Sigma PN A2706)
- Glacial acetic acid (Sigma PN A6283 or equivalent)
- Methanol (Fisher PN A454 or equivalent)

Customer Preparation Requirements

[Return to checklist.](#)

Site Requirements

After the system has been installed, an FSE will demonstrate basic system operation to up to two operators.

Operators should be available for the entire training period.

Mass Spectrometer Requirements (CESI-MS Systems Only)

[Return to checklist.](#)

Before the Installation

Before the CESI 8000 Plus System can be installed, the mass spectrometer must be operational. To demonstrate this, a performance test should be performed and a printout of the results attached to this document.

For some mass spectrometers, additional equipment is required, refer to the appropriate section below.

During the Installation

During the installation, a person who is familiar with the operation of the mass spectrometer should be available to operate the system.

SCIEX Mass Spectrometers

For the OptiMS Adapter for SCIEX NanoSpray III source (PN B07363), all systems require the NanoSpray[®] III ion source retrofit kit (PN 5030793), purchased from SCIEX.

Make sure that the required orifice plate for the NanoSpray[®] ion source is present (refer to the following table).

Model	NanoSpray [®] III Ion Source Part Number	Orifice Plate Part Number
SCIEX Triple Quad [™] 5500 system	5028129	1033731
QTRAP [®] 5500 system		
TripleTOF [®] 4600, 5600, and 5600+ systems		
TripleTOF [®] 6600 system	5029154	1033731

Model	NanoSpray [®] III Ion Source Part Number	Orifice Plate Part Number
SCIEX Triple Quad [™] 6500 and 6500+ systems	5028138	5018950
QTRAP [®] 6500 and 6500+ systems		

Thermo Scientific Mass Spectrometers

For the OptiMS Adapter for Thermo Nanospray II MS Sources (PN B07366), make sure the additional required equipment is present (refer to the following table).

Model	Ion Source	Additional Required Equipment
LCQ Deca XP MAX, LTQ series and the TSQ series systems	Nanospray II ion source	Ion MAX adapter
LCQ Deca XP and LCQ Advantage XP systems	Nanospray II ion source	Adapter ring

For the OptiMS Thermo MS Adapter for Nanospray Flex and Nanospray Flex NG Sources (PN B83386), no additional equipment is required.

Bruker Mass Spectrometers

The OptiMS Bruker MS Adapter for Bruker Mass Spectrometers (PN B86099) requires the NanoElectrospray capillary cap set (PN 212915), purchased from Bruker.

For Bruker mass spectrometers that are close to the ground, the CESI 8000 Plus System requires a low table or stand. Refer to [Height Requirements \(CESI-MS Systems Only\)](#).

Waters Mass Spectrometers

No additional equipment from Waters is required for the OptiMS Waters MS Adapter for NanoLockSpray and NanoFlow Ion Sources (PN B85211).

Equipment Safety Categories

B

Description	Category
Equipment pollution degree	Pollution Degree 2

Note: Environments with a Pollution Degree 2 rating include laboratories and sales and commercial areas.

For more information, refer to the International Electrotechnical Commission standards IEC 61010-1 and IEC 60364.

Computer Specifications for Empower™ Software

C

The tables below describe different computer configurations for Empower™ Software.

Note: The information below is taken from the *Waters Empower 3 Installation, Configuration, and Upgrade Guide*, revision B. Specifications may have changed since publication.

Table C-1 Empower Personal Workstation or Client Computer, LAC/E³² Module

Component	Specifications
Operating system	Windows 7 Enterprise or Professional, SP1, 64-bit
	Note: Windows 7, 32-bit is not supported.
	Windows 10 Enterprise or Professional, 64-bit
Oracle	Oracle version 12.1.0.2.0
CPU	Minimum: Intel 2 Duo, E6400 2.13GHz Recommended: Intel Core 2 Duo, E8400 3.0GHz
Random access memory (RAM)	Minimum: 8 GB Recommended: 16 GB
Virtual memory	4 × installed RAM
Hard drive	Minimum: 25 GB Recommended: Actual space recommendations depend on usage for both new installations and upgrades to Empower™ Software. Make sure that there is enough space for raw data files.
Free disk space	<ul style="list-style-type: none"> • 2 GB for Empower™ 3 Software (FR4) • 13 GB for Oracle and Empower database (new installations) • 23 GB for Oracle and Empower database (upgrades) Minimum: 5 GB for projects
DVD drive	Access to a DVD drive required

Computer Specifications for Empower™ Software

Table C-1 Empower Personal Workstation or Client Computer, LAC/E³² Module (continued)

Component	Specifications
Monitor resolution	Minimum: 1024 × 768 Recommended: 1920 × 1080
Graphics capability	sVGA video at 1024 × 768, 256 colors
Optional control interfaces	<ul style="list-style-type: none"> Waters Bus Laboratory Acquisition and Control/Environment (busLAC/E) card (BusLAC/E driver 7.0.1.1 automatically installed if busLAC/E card detected during Empower™ Software installation) 8-port serial hub Edgeport USB-to-serial converter cable
Application software	Empower™ 3 Software (FR4)
Ethernet adapters	<ul style="list-style-type: none"> 1 Ethernet adapter for network connectivity 1 Ethernet adapter to operate Ethernet instruments (not used for CESI 8000 Plus Systems) 1 Ethernet adapter for the client Minimum: Greater than 100 Mbps Recommended: 1 Gbps

Table C-2 Empower Client Computers or LAC/E Module

Component	Specifications
Operating system	Windows 7 Enterprise or Professional, SP1, 64-bit <hr/> Note: Windows 7, 32-bit is not supported. <hr/> Windows 10 Enterprise or Professional, 64-bit LAC/E configurations 12, 13, and 14 for Windows 7 only LAC/E configuration 15 for Windows 7 and 10
Oracle	Oracle client version 12.1.0.2.0 for 32-bit
CPU	Minimum: CPU for Windows 7 or 10 Intel 2 Duo, E6400 2.13 GHz Recommended: Intel Core 2 Duo, E8400 3.0 GHz

Table C-2 Empower Client Computers or LAC/E Module (continued)

Component	Specifications
Random access memory (RAM)	Minimum: 4 GB Recommended: 8 GB
Virtual memory	4 × installed RAM
Hard drive	25 GB
Free disk space	2 GB for Empower™ 3 Software (FR4)
Monitor	Minimum: 1024 × 768 resolution (except for LAC/E modules) Recommended: 1920 × 1080 resolution for client
Graphics capability	sVGA video at 1024 × 768, 256 colors
Optional control interfaces	<ul style="list-style-type: none"> • Waters Bus Laboratory Acquisition and Control/Environment (busLAC/E) card (BusLAC/E driver 7.0.1.1 automatically installed if busLAC/E card detected during Empower™ Software installation) • 8-port serial hub • Edgeport USB-to-serial converter cable
Application software	Empower™ 3 Software (FR4)
Ethernet adapters	<ul style="list-style-type: none"> • 1 Ethernet adapter for network connectivity • 1 Ethernet adapter to operate Ethernet instruments (not used for CESI 8000 Plus Systems) • 1 Ethernet adapter for the client Minimum: Greater than 100 Mbps Recommended: 1 Gbps

Table C-3 Empower Enterprise and Workgroup Server

Component	Specifications
Operating system	Windows Server 2008 R2 SP1, Enterprise or Standard 64-bit Windows Server 2012 R2, Standard 64-bit
Oracle	Oracle 12.1.0.2.0
CPU	Minimum: 1 × Intel Xeon 1 × E5-2620v3 (4 cores at 1.8 GHz) Recommended: 2 × Intel Xeon E52620 (6 cores at 2.4GHz)

Computer Specifications for Empower™ Software

Table C-3 Empower Enterprise and Workgroup Server (continued)

Component	Specifications
Random access memory (RAM)	Minimum: 8 GB Recommended: 24 GB
Virtual memory	4x installed RAM
Free disk space	<ul style="list-style-type: none"> • 1 GB for Empower™ 3 Software (FR4) • 13 GB for Oracle and Empower database (new installations) • 20 GB for Oracle and Empower database (upgrades) Minimum: 5 GB of free disk space to accommodate projects Recommended: Actual space recommendations depend on your usage for both new installations and upgrades to Empower software.
Backup device	Optional, but recommended
Monitor and graphics capability	Required sVGA video at 1024 × 768, 256 colors
Printer	Access to a printer required
Application software	Web browser: Google Chrome 35 or later Recommendation: Waters recommends Google Chrome for use with Waters Database Manager (WDM)
Network interface card	1 Gbps NIC

Table C-4 Citrix Server

Component	Specifications
Operating system	Windows Server 2008 R2 Enterprise or Standard 64-bit Windows Server 2012 R2 Standard 64-bit
Citrix XenApp software	XenApp 7.6 (running in Windows Server 2008 R2 Enterprise or Standard Edition 64-bit) XenApp 7.6 (running in Windows Server 2012 R2 64-bit)
Random access memory (RAM)	Minimum: 2 GB Recommended: 8 GB
Virtual memory	4x installed RAM

Table C-5 UNIX Server

Component	Specifications
Operating system	Solaris 10 (8/11), patched to 9/11
Hardware	T5240, T4-2, or equivalent
Random access memory (RAM)	Minimum: 8 GB Recommended: 24 GB
Hard drive	4 local hard drives (additional SAN storage recommended)
Virtual memory	4 × installed RAM
DVD drive	Access to a DVD driver
Backup device	Optional, but recommended
Monitor	Not required
Graphics capability	If using a local graphics card, minimum 1024 × 768, 16-bit color
Server software	Solaris 10 (8/11) Oracle RDBMS (Relational Database Management System) 12.1.0.2.0
Network interface card	Multiple 1 Gbps NICs, teamed

Table C-6 Linux Server

Component	Specifications
Operating system	Red Hat Enterprise Linux 6.8
CPU	Minimum: 1 × 4 cores at 1.8 GHz Recommended: 2 × 6 cores at 2.4 GHz
Random access memory (RAM)	Minimum: 8 GB Recommended: 24 GB
Virtual memory	4 × installed RAM
Hard drive	4 local hard drives (27 GB total), additional SAN storage recommended
Backup device	Optional, but recommended
Monitor	Not required
Graphics capability	If using a local graphics card, minimum 1024 × 768, 16-bit color is required

Computer Specifications for Empower™ Software

Table C-6 Linux Server (continued)

Component	Specifications
Server software	Red Hat Enterprise Linux 6.2 (Oracle RDBMS Relational Database Management System) 12.1.0.2.0
Network interface card	Multiple 1 Gbps NICs

Table C-7 Empower File Server

Component	Specifications
Operating system	Windows Server 2008 R2 SP1, Enterprise, or Standard (64-bit) Windows Server 2012 R2 Standard (64-bit)
Random access memory (RAM)	Minimum: 8 GB Recommended: 16 GB
Virtual memory	4 × installed RAM