MiSeq® System
Site Prep Guide

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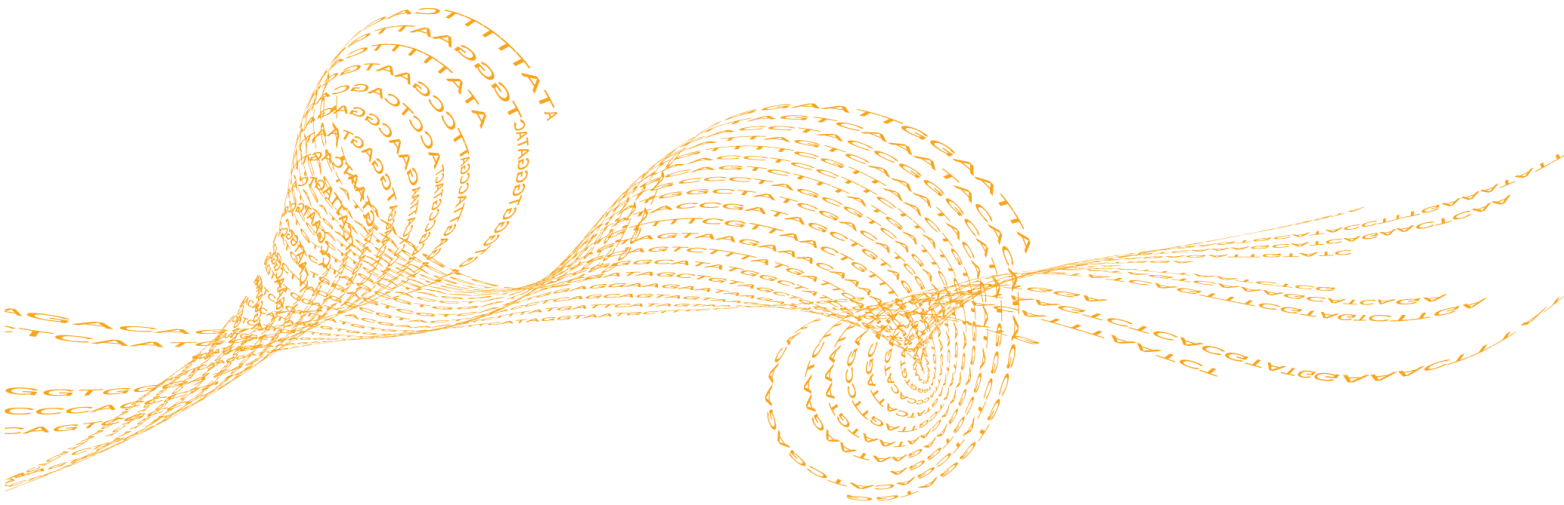

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Revision History

Part #	Revision	Date	Description of Change
15027615	F	August 2014	Added compatibility recommendations for network maintenance activities. Updated anti-virus configuration information. Updated product certification and compliance information. Added sodium hypochlorite for template line washes to the list of user-supplied consumables. Added guide information for the VeriSeq workflow to Additional Resources. Updated VWR catalog number for alcohol wipes to 95041-714. Updated SDS link to support.illumina.com/sds.html.
15027615	E	April 2014	Removed the lab ambient temperature variation specification. Corrected lab temperature range specification to 19°C to 25°C (22°C ±3°C). Corrected lab relative non-condensing humidity specification to 30–75%.
15027615	D	October 2013	Removed Tris-Cl 10 mM, pH 8.5 from the list of user-supplied consumables. Added Tween 20 for performing instrument washes to the list of user-supplied consumables. Added microcentrifuge tubes to the list of user-supplied consumables.
15027615	C	February 2012	Added information about moving the MiSeq improperly.
15027615	B	December 2011	Noted that locating the instrument in a post-PCR laboratory is recommended when sequencing PCR amplicons. Added information about generator-backed power outages on sequencing runs.
15027615	A	September 2011	Initial release

Introduction

This guide provides specifications and guidelines for preparing your site for installation and operation of the Illumina® MiSeq® system:

- Laboratory space requirements
- Electrical requirements
- Environmental constraints
- Computing requirements
- User-supplied consumables and equipment

Additional Resources

The following documentation is available for download from the Illumina website.

Resource	Description
MiSeq System Safety and Compliance Guide	Provides information about instrument labeling, compliance certifications, and safety considerations.
MiSeq Workflow Quick Reference Cards	Provides a two-page graphical representation of the workflow for the experienced user. The quick reference cards summarize sample prep, run setup, and run monitoring, as well as provide an overview of the analysis performed by MiSeq Reporter.
Illumina Experiment Manager User Guide	Provides instructions for creating sample plates and sample sheets for different workflows and library types. Illumina recommends that you create your sample sheet during the sample preparation step.
BlueFuse Workflow Manager Reference Guide	Provides instructions for creating sample plates and sample sheets for customers performing the VeriSeq workflow. Illumina recommends that you create your sample sheet during the sample preparation step.
MiSeq Sample Sheet Quick Reference Guide	Provides information about adding sample sheet settings to your sample sheet.
MiSeq Reagent Prep Guide	Provides a description of kit contents and instructions for preparing the reagent cartridge before beginning your sequencing run.
Preparing DNA Libraries for Sequencing on the MiSeq	Provides instructions for denaturing and diluting prepared sample libraries before sequencing on the MiSeq, and preparing a PhiX control. This step applies to most library types.
Using Custom Primers on the MiSeq	Provides instructions for preparing and loading custom primers, and editing the samples sheet for custom primers.
MiSeq System User Guide	Provides an overview of instrument components and software, instructions for performing sequencing runs, and procedures for proper instrument maintenance and troubleshooting.

Resource	Description
MiSeq Reporter User Guide	Provides a comprehensive overview of analysis procedures, analysis workflows, and output files generated by MiSeq Reporter, as well as computing requirements, off-instrument installation instructions, and troubleshooting information.
BlueFuse Multi Reference Guide	For customers performing the VeriSeq workflow, provides a comprehensive overview of analysis procedures, analysis workflows, and files generated by BlueFuse Multi, as well as computing requirements, and troubleshooting information.
MiSeq Reporter Online Help	Provides instructions for using the MiSeq Reporter software.
BaseSpace Online Help	Provides instructions for using BaseSpace and descriptions of the graphs generated for each analysis workflow.

Visit the MiSeq system support page on the Illumina website for access to documentation, software downloads, online training, and frequently asked questions.

Delivery and Installation

An Illumina-authorized service provider delivers the instrument, uncrates the system, and places it on the lab bench. The space and bench must be ready in advance of delivery.

CAUTION
Only Illumina-authorized personnel can uncrate, install, or move the instrument. Mishandling of the instrument can affect the alignment or damage instrument components.

An Illumina representative installs and prepares the instrument. If you plan to connect the instrument to a data management system or remote network location, make sure that the path for data storage is selected before the date of installation. The Illumina representative can test the data transfer process during installation.

CAUTION
After your Illumina representative has installed and prepared the instrument, ***do not*** relocate the instrument. Moving the instrument improperly can affect the optical alignment and compromise data integrity. If you have to relocate the instrument, contact your Illumina representative.

Crated Dimensions and Contents

The MiSeq is shipped in one crate. Use the following dimensions to determine the minimum door width required to accommodate the shipping container.

Measurement	Crated Dimensions
Width	72.4 cm (28.5 in.)
Height	76.8 cm (30.25 in.)
Depth	83.8 cm (33 in.)
Weight	90.7 kg (200 lbs.)

The crate contains the MiSeq instrument along with the following components:

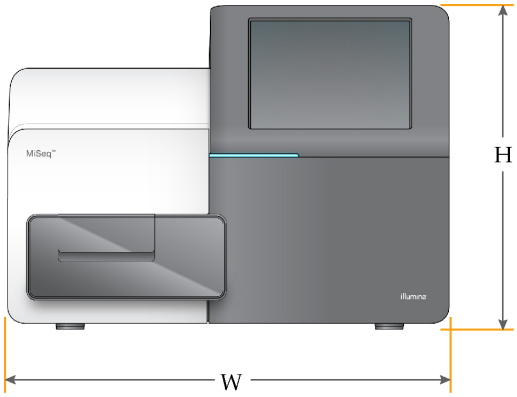
- Waste bottle, drip tray, and two labels for shipping restraint locations.
- MiSeq Accessories Kit, which contains the following components:
  - *MiSeq System User Guide*
  - *MiSeq System Safety and Compliance Guide*
  - Wash tray
  - Wash bottle, 500 ml
  - Waste bottle stopper (red)
  - T-handle hex-drive tool, 6 mm
  - T-handle hex-drive tool, 5/64 in.
  - Network cable, shielded CAT6
- Power cord

Laboratory Requirements

This section provides requirements and guidelines to set up your lab space for the MiSeq properly. For more information, see *Environmental Considerations* on page 13.

Instrument Dimensions

Figure 1 MiSeq Instrument



The MiSeq has the following dimensions upon installation:

Measurement	Instrument Dimensions
Width	68.6 cm (27 in.)
Height	52.3 cm (20.6 in.)
Depth	56.5 cm (22.2 in.)
Weight	57.2 kg (126 lbs.)

Placement Requirements

The MiSeq must be positioned to allow access to the power switch and power outlet, for proper ventilation, and for servicing the instrument.

- Make sure that you can reach around the right-side of the instrument to turn on or turn off the power switch on the back panel adjacent to the power cord.
- Position the instrument so that personnel can quickly disconnect the power cord from the outlet.
- The instrument must be accessible from all sides using the following minimum clearance dimensions:

Access	Minimum Clearance
Sides	Allow at least 61 cm (24 in.) on each side of the instrument.
Rear	Allow at least 10.2 cm (4 in.) behind the instrument.
Top	Allow at least 61 cm (24 in.) above the instrument. If the instrument is positioned under a shelf, make sure that the minimum clearance requirement is met.

CAUTION
If you need to relocate the MiSeq, contact your Illumina representative. Moving the instrument improperly can impact the optical alignment and compromise data integrity.

Lab Bench Guidelines

Illumina recommends placing the instrument on a lab bench without casters. The bench must support the weight of the instrument, which is 57.2 kg (126 lbs.).

Width	Height	Depth	Casters
122 cm (48 in.)	91.4 cm (36 in.)	76.2 cm (30 in.)	No

For North American customers, Illumina recommends the following lab bench: Bench-Tek Solutions (www.bench-tek.com), part # BT40CR-3048BS-PS

Vibration Guidelines

CAUTION
The MiSeq is sensitive to vibrations.

Use the following guidelines to minimize vibrations during sequencing runs and ensure optimal performance:

- Place the instrument on a sturdy immobilized lab bench.
- Do not place other equipment on the bench that produces vibrations, such as a shaker, vortexer, centrifuge, or instruments with heavy fans.
- Do not install the instrument near frequently used doors. Opening and closing of doors might induce vibrations.
- Do not install a keyboard tray that hangs below the bench.
- Do not touch the instrument or open the reagent compartment or flow cell compartment during sequencing.
- Do not place objects on top of the instrument.

Lab Setup for PCR

The polymerase chain reaction (PCR) process is used with some Illumina sample prep kits to prepare libraries for amplicon sequencing.

For more information, visit the support pages on the Illumina website. Unless you exercise sufficient caution, PCR products can contaminate reagents, instruments, and samples, causing inaccurate and unreliable results. PCR product contamination can adversely affect lab processes and delay normal operations.

CAUTION
To prevent PCR product contamination, establish dedicated areas and lab procedures before you begin work in the lab.

Dedicate Physically Separate Areas

Make sure that your lab is set up appropriately to reduce the risk of PCR product contamination. If you intend to use the MiSeq for sequencing PCR amplicons, the instrument must be located in the post-PCR laboratory.

- Dedicate physically separate pre-PCR laboratory space where pre-PCR processes are performed (DNA extraction, quantification, and normalization).
- Dedicate physically separate post-PCR laboratory space where PCR products are made and processed.

- Do not use the same sink to wash pre-PCR and post-PCR materials.
- Do not share water purification systems for pre-PCR and post-PCR processes.
- Store all supplies used in pre-PCR protocols in the pre-PCR area, and transfer to the post-PCR area as needed.

Dedicate Equipment and Supplies

- Dedicate separate full sets of equipment and supplies (pipettes, incubator, heat block, vortexer, centrifuge, etc.) to pre-PCR and post-PCR lab processes. Do not share equipment and supplies between processes.
- Dedicate separate storage areas (freezers and refrigerators) for pre-PCR and post-PCR consumables.

Electrical Requirements

This section lists power specifications and describes electrical requirements for your facility.

Power Specifications

Type	Specification
Line Voltage	100–240 Volts AC @ 50/60 Hz
Power Consumption	400 Watts

Receptacles

Your facility must be wired with the following equipment:

- **For 100–110 Volts AC**—A 10-amp grounded, dedicated line with proper voltage and electrical ground is required.
  North America and Japan—Receptacle: NEMA 5-15
- **For 220–240 Volts AC**—A 6-amp grounded line with proper voltage and electrical ground is required.
- If the voltage fluctuates more than 10%, a power line regulator is required.

Protective Earth

The instrument has a connection to protective earth through the enclosure. The safety ground on the power cord returns protective earth to a safe reference. The protective earth connection on the power cord must be in good working condition when using this device.

Power Cords

The instrument is equipped with an international standard IEC 60320 C13 receptacle and is shipped with a region-specific power cord.

Hazardous voltages are removed from the instrument only when the power cord is disconnected from the AC power source.

To obtain equivalent receptacles or power cords that comply with local standards, consult a third-party supplier such as Interpower Corporation (www.interpower.com).

CAUTION
Never use an extension cord to connect the instrument to a power supply.

Fuses

The MiSeq contains no user-replaceable fuses.

Uninterruptible Power Supply

Illumina recommends the use of a user-supplied uninterruptible power supply (UPS). Illumina is not responsible for runs affected by interrupted power regardless of whether the instrument is on a UPS. Standard generator-backed power is often not uninterruptible and a brief power outage occurs before power resumes, which interrupts a sequencing run.

The following table lists region-specific recommendations to consider.

Specification	APC Smart UPS #SUA1500JB (Japan)	APC Back-UPS Pro #BR1500G (North America)	APC Back-UPS Pro #BR1500GI (International)
Maximum Watts	980 W	865 W	865 W
Maximum Current	1500 VA	1500 VA	1500 VA
Input Voltage (nominal)	100 VAC	120 VAC	230 VAC
Input Connection	NEMA 5-15P	NEMA 5-15P	IEC-320 C14
Typical Run Time (50% load)	23.9 minutes	12.8 minutes	15.8 minutes
Typical Run Time (100% load)	6.7 minutes	3 minutes	5.5 minutes

To obtain an equivalent UPS that complies with local standards for facilities outside the referenced regions, consult a third-party supplier such as Interpower Corporation (www.interpower.com).

Product Certifications and Compliance

The MiSeq is certified to the following standards:

- UL STD 61010-1
- CSA STD C22.2 No 61010-1
- IEC/EN 61010-1
- IEC/EN 61326-1
- IEC/EN 61326-2-6

The MiSeq complies with the following directives:

- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC
- R&TTE Directive 1999/5/EC

Environmental Considerations

Element	Specification
Temperature	Maintain a lab temperature of 19°C to 25°C (22°C ±3°C). This temperature is the operating temperature of the instrument.
Humidity	Maintain a non-condensing relative humidity between 30–75%.
Elevation	Locate the instrument at an altitude below 2000 meters (6500 feet).
Air Quality	Operate the instrument in a Pollution Degree II environment or better. A Pollution Degree II environment is defined as one that normally includes only non-conductive pollutants.
Ventilation	Consult your facilities department for ventilation requirements based on the instrument heat output specifications.

Heat Output

Measured Power	Thermal Output
400 Watts	1,364 BTU/h

Noise Output

The MiSeq is an air-cooled instrument. Noise from the fan is clearly audible when the instrument is running.

Noise Output (dB)	Distance from Instrument
< 62 dB	1 meter (3.3 feet)

A measurement of < 62 dB is the level of a normal conversation at a distance of approximately 1 meter (3.3 feet).

Network Considerations

A network connection is recommended due to the amount of data generated by the MiSeq.

- A shielded CAT6 network cable of 3 meters (9.8 feet) in length is provided with the instrument.

To use the following features, network and internet connections are required:

- Receive and install software updates from the MiSeq Control Software interface.
- Access manifest files, sample sheets, and references on a network server from the MCS interface.
- Easily move data from previous runs and analyses to a server location for storage, and to manage disk space on the integrated MiSeq computer.
- Monitor the run in progress using the Illumina Sequencing Analysis Viewer software (optional).
- Monitor and manage secondary analysis using the MiSeq Reporter analysis software.
- Use Live Help, an on-instrument feature that connects you to Illumina Technical Support for troubleshooting.

Use the following recommendations to install and configure a network connection:

- Use a 1 gigabit connection between the instrument and your data management system. This connection can be made directly or through a network switch.
- Upon connection to a network, configure Windows Update so that theMiSeq does not automatically update. Illumina recommends waiting one month after a Windows release before allowing an update.

Network Support

Illumina does not provide installation or technical support for networking the instrument.

Review network maintenance activities for potential compatibility risks with the Illumina system, including the following risks:

- **Removal of the Group Policy Objects (GPOs)**—GPOs can affect the operating system (OS) of connected Illumina resources. OS changes can disrupt the proprietary software in Illumina systems.
  Illumina instruments have been tested and verified to operate correctly. After connecting to domain GPOs, some settings might affect the instrument software. If the instrument software operates incorrectly, consult your facility IT administrator about possible GPO interference.
- **Activation of Windows Firewall and Windows Defender**—These Windows products can affect the OS resources that Illumina software accesses. Illumina recommends installing anti-virus software to protect the instrument control computer against viruses. For more information, see *Anti-Virus Software* on page 15.
- **Changes to the privileges of preconfigured users**—Illumina recommends maintaining existing privileges for preconfigured users. However, the preconfigured users can be made unavailable.

Anti-Virus Software

Illumina recommends that you purchase and install an anti-virus software of your choice to protect the instrument control computer against viruses. Illumina has tested Symantec on Windows 7 with the following settings.

To avoid data loss or interfering with instrument operations, configure the anti-virus software as follows:

- Set for manual scans. Do not enable automatic scans.
- Perform manual scans only when the instrument is not in use.
- Set updates to download without user authorization, but not install.
- Do not update during instrument operation. Update only when the instrument is not running and when it is safe to reboot the instrument computer.
- Do not reboot the computer automatically upon update.
- Exclude the application directory and data drives from any real-time file system protection, specifically C:\Illumina, and the D:\ and E:\ drives.

User-Supplied Consumables and Equipment

The following consumables and equipment are required for sequencing runs are performed on the MiSeq. For more information, see the *MiSeq System User Guide*.

User-Supplied Consumables

Make sure that the following user-supplied consumables are available before beginning a run.

Consumable	Supplier	Purpose
Stock 1.0 N NaOH, molecular biology-grade	General lab supplier	Denaturing sample libraries and PhiX control DNA
Alcohol wipes, 70% Isopropyl or Ethanol, 70%	VWR, catalog # 95041-714* General lab supplier	Cleaning the flow cell holder
Disposable gloves, powder-free	General lab supplier	General use
Lab tissue, low-lint	VWR, catalog # 21905-026*	Cleaning the flow cell stage and the foil seal covering the load samples reservoir
Lens paper, 4 x 6 in.	VWR, catalog # 52846-001*	Cleaning the flow cell
Microcentrifuge tubes	General lab supplier	Denaturing and diluting sample libraries and PhiX control DNA
Sodium hypochlorite	General lab supplier	Washing the template line, for use with the VeriSeq workflow (optional for other workflows)
Tween 20	Sigma-Aldrich, catalog # P7949	Washing the instrument
Tweezers, square-tip plastic (optional)	McMaster-Carr, catalog # 7003A22*	Removing flow cell from flow cell shipping container
Water, laboratory-grade	General lab supplier	Washing the instrument

* or equivalent

Guidelines for Laboratory-Grade Water

Always use laboratory-grade water to perform instrument procedures. Never use tap water or deionized water. Any of the following are acceptable examples:

- Illumina PW1
- 18 Megohm (MΩ) water
- Milli-Q water
- Super-Q water
- Molecular biology-grade water

User-Supplied Equipment

Item	Source
Freezer, -25°C to -15°C, frost-free	General lab supplier
Ice bucket	General lab supplier
Refrigerator, 2°C to 8°C	General lab supplier

Required Storage Space for Consumables

MiSeq reagents are provided in single-use reagent cartridges. Use the following information to estimate required consumable storage space.

Item (one per run)	Storage Requirement	Size (W x L x H)
Reagent cartridge	-25°C to -15°C	11 cm (4.5 in.) x 21 cm (8.25 in.) x 7 cm (2.75 in.)
PR2 bottle	2°C to 8°C	500 ml bottle
Flow cell	2°C to 8°C	3.7 cm (1.5 in.) x 5.5 cm (2.2 in.)

Notes

Technical Assistance

For technical assistance, contact Illumina Technical Support.

Table 1 Illumina General Contact Information

Illumina Website	www.illumina.com
Email	techsupport@illumina.com

Table 2 Illumina Customer Support Telephone Numbers

Region	Contact Number	Region	Contact Number
North America	1.800.809.4566	Italy	800.874909
Austria	0800.296575	Netherlands	0800.0223859
Belgium	0800.81102	Norway	800.16836
Denmark	80882346	Spain	900.812168
Finland	0800.918363	Sweden	020790181
France	0800.911850	Switzerland	0800.563118
Germany	0800.180.8994	United Kingdom	0800.917.0041
Ireland	1.800.812949	Other countries	+44.1799.534000

Safety Data Sheets

Safety data sheets (SDSs) are available on the Illumina website at support.illumina.com/sds.html.

Product Documentation

Product documentation in PDF is available for download from the Illumina website. Go to support.illumina.com, select a product, then click **Documentation & Literature**.

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