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Introduction

This guide provides specifications and guidelines for preparing your site for installation and operation of the Illumina® NextSeq™ 550Dx instrument:

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

Safety Considerations

See the *NextSeq 550Dx Instrument Safety and Compliance Guide (document # 1000000009868)* for important information about safety considerations.

Additional Resources

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

Resource	Description
<i>NextSeq 550Dx Instrument Safety and Compliance Guide (document # 1000000009868)</i>	Provides information about operational safety considerations, compliance statements, and instrument labeling.
<i>RFID Reader Compliance Guide (document # 1000000030332)</i>	Provides information about the RFID reader in the instrument, compliance certifications, and safety considerations.
<i>NextSeq 550Dx Research Mode Instrument Reference Guide (document # 1000000041922)</i>	Provides instructions for operating the instrument and troubleshooting procedures. For use when operating the NextSeq 550Dx instrument in research mode with NextSeq Control Software (NCS) v3.0.
<i>NextSeq 550 System Guide (document # 15069765)</i>	Provides instructions for operating the instrument and troubleshooting procedures. For use when operating the NextSeq 550Dx instrument in research mode with NextSeq Control Software (NCS) v4.0 or later.
<i>NextSeq 550Dx Instrument Reference Guide (document # 1000000009513)</i>	Provides an overview of instrument components, instructions for operating the instrument, and maintenance and troubleshooting procedures.

Visit the [NextSeq 550Dx support pages](#) on the Illumina website for access to documentation, software downloads, online training, and frequently asked questions.

Delivery and Installation

An authorized service provider delivers the instrument, uncrates components, and places the instrument on the lab bench. Make sure that the lab space and bench are ready before delivery.

Access to the instrument USB ports are required for installation, maintenance, and service.

**CAUTION**

Only 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. When connecting 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 NextSeq 550Dx instrument is shipped in one crate. Use the following dimensions to determine the minimum door width required to accommodate the shipping container.

Measurement	Crated Dimensions
Height	97 cm (38 in)
Width	90 cm (35.5 in)
Depth	94 cm (37 in)
Weight	165 kg (364 lb)

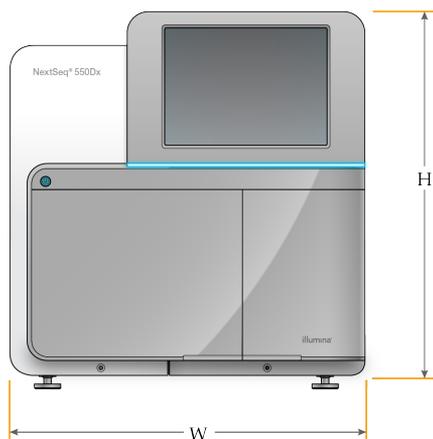
The crate contains the instrument along with the following components:

- ▶ Spent reagents bottle
- ▶ Reagent wash cartridge and buffer wash cartridge
- ▶ BeadChip adapter
- ▶ Power cord
- ▶ Accessories kit, which contains the following components:
 - ▶ Keyboard and mouse
 - ▶ *NextSeq 550Dx Instrument Product Insert (document # 1000000041523)*

Laboratory Requirements

This section provides specifications and requirements for setting up your lab space. For more information, see [Environmental Considerations on page 8](#).

Instrument Dimensions



Measurement	Instrument Dimensions (Installed)
Height	58.5 cm (23 in)
Width	54 cm (21 in)
Depth	69 cm (27 in)
Weight	84 kg (186 lb)

Placement Requirements

Position the instrument to allow proper ventilation, access to the power switch and power outlet, and access for servicing the instrument.

- ▶ Make sure that you can reach around the left-side of the instrument to access the power switch on the back panel.
- ▶ Position the instrument so that personnel can quickly disconnect the power cord from the outlet.
- ▶ Make sure that the instrument is accessible from all sides.

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.



CAUTION

Moving the instrument improperly can affect the optical alignment and compromise data integrity. If you have to relocate the instrument, contact your Illumina representative.

Lab Bench Guidelines

The instrument includes precision optical elements. Place the instrument on a sturdy lab bench away from sources of vibration.

Width	Height	Depth	Casters
122 cm (48 in)	91.4 cm (36 in)	76.2 cm (30 in)	Optional

Vibration Guidelines

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

- ▶ Place the instrument on a sturdy lab bench.
- ▶ Do not place other equipment on the bench that can produce vibrations, such as a shaker, vortexer, centrifuge, or instruments with heavy fans.
- ▶ Do not place objects on top of the instrument.
- ▶ When the instrument is sequencing, do not open the reagent compartment door, buffer compartment door, right service panel, or flow cell door.

Lab Setup for PCR Procedures

Some library prep methods require the polymerase chain reaction (PCR) process.

Establish dedicated areas and lab procedures to prevent PCR product contamination before you begin work in the lab. PCR products can contaminate reagents, instruments, and samples, causing inaccurate results and delay normal operations.

Establish Pre-PCR and Post-PCR Areas

- ▶ Establish a pre-PCR area for pre-PCR processes.
- ▶ Establish a post-PCR area for processing PCR products.
- ▶ Do not use the same sink to wash pre-PCR and post-PCR materials.
- ▶ Do not use the same water purification system for pre-PCR and post-PCR areas.
- ▶ Store supplies used in pre-PCR protocols in the pre-PCR area, and transfer to the post-PCR area as needed.

Dedicate Equipment and Supplies

- ▶ Do not share equipment and supplies between pre-PCR and post-PCR processes. Dedicate a separate set of equipment and supplies in each area.
- ▶ Establish dedicated storage areas for consumables used in each area.

Required Storage for Sequencing Consumables

Item (1 per run)	Storage Requirement
Library dilution buffer	-25°C to -15°C
Reagent cartridge	-25°C to -15°C
Buffer cartridge	15°C to 30°C
Flow cell cartridge*	2°C to 8°C

* The NextSeq 550Dx High Output Flow Cell Cartridge v2.5 is shipped at ambient temperature.

Electrical Requirements

Power Specifications

Type	Specification
Line Voltage	100–240 Volts AC @ 50/60 Hz
Power Supply Rating	600 Watts, maximum

Receptacles

Your facility must be wired with the following equipment:

- ▶ **For 100–120 Volts AC**—A 15 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 10 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 comes with an international standard IEC 60320 C20 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 instrument contains no user-replaceable fuses.

Uninterruptible Power Supply

A user-supplied uninterruptible power supply (UPS) is highly recommended. Illumina is not responsible for runs affected by interrupted power regardless of whether the instrument is connected to a UPS. Standard generator-backed power is often *not* uninterruptible and a brief power outage is typical before power resumes.

The following table lists region-specific recommendations.

Specification	APC Smart UPS 2200 VA LCD 120 V (North America)	APC Smart UPS 1500 VA LCD 100 V (Japan)	APC Smart UPS 2200 VA LCD 230 V (International)
Maximum Power	1920 W	980 W	1980 W
Input Voltage (nominal)	100–120 VAC	100 VAC	220–240 VAC
Input Frequency	50/60 Hz	50/60 Hz	50/60 Hz
Input Connection	NEMA 5-20P	NEMA 5-15P	IEC-320 C20
Typical Run Time (300 W)	90 minutes	51 minutes	90 minutes
Typical Run Time (600 W)	40 minutes	17 minutes	40 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).

Environmental Considerations

Element	Specification
Temperature	Transportation and Storage: -10°C to 50°C (14°F to 122°F). Operating Conditions: Maintain a lab temperature of 19°C to 25°C (22°C ±3°C). This temperature is the operating temperature of the instrument. During a run, do not allow the ambient temperature to vary more than ±2°C.
Humidity	Transportation and Storage: Non-condensing humidity between 15-80%. Operating Conditions: Maintain a noncondensing relative humidity between 20–80%.
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 an environment that normally includes only nonconductive pollutants.
Ventilation	Consult your facilities department for ventilation requirements based on the instrument heat output specifications.

Heat Output

Measured Power	Thermal Output
600 Watts	2048 BTU/hour

Noise Output

Noise Output (dB)	Distance from Instrument
<70 dB	1 meter (3.3 feet)

A measurement of < 70 dB is within the level of a normal conversation at a distance of approximately 1 meter (3.3 feet).

Network Considerations

The NextSeq 550Dx instrument is designed for use with a network.

Performing a run in standalone mode requires a network connection to transfer run data to a network location. The instrument must be in research mode to run in standalone mode. Do not save run data to the local hard drive on the NextSeq 550Dx instrument. The hard drive is intended for temporary storage before data are transferred automatically. Any data saved on the hard drive beyond the current run fills the hard drive and prevents subsequent runs until space is made available.

An internet connection is required for the following operations:

- ▶ Install updates to the NextSeq 550Dx Operating Software (NOS) from the instrument interface.
- ▶ [Optional] Upload instrument performance data.
- ▶ [Optional] Remote assistance from Illumina Technical Support.

Network Connections

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

- ▶ Use a dedicated 1 GB connection between the instrument and your data management system. This connection can be made directly or through a network switch.
- ▶ Required bandwidth for a connection is:
 - ▶ 50 Mb/s per instrument for internal network uploads.
 - ▶ [Optional] 5 Mb/s per instrument for performance data uploads.
- ▶ Switches must be managed.
- ▶ Network equipment such as switches must have a minimum of 1 GB/s.
- ▶ Calculate the total capacity of the workload on each network switch. The number of connected instruments and ancillary equipment such as a printer can impact capacity.

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

- ▶ If possible, isolate sequencing traffic from other network traffic.
- ▶ Cables must be CAT 5e or better. A shielded CAT 5e network cable of 3 meters (9.8 feet) in length is provided with the instrument for network connections.
- ▶ Configure Windows Updates to prevent automatic updates.

Network Support

Illumina does not install or provide technical support for network connections.

Review network maintenance activities for potential compatibility risks with the Illumina instrument, 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 used by Illumina software. Install antivirus software to protect the instrument control computer.

- ▶ **Changes to the privileges of preconfigured users**—Maintain existing privileges for preconfigured users. Make preconfigured users unavailable as needed.

Internal Connections

Connection	Value	Purpose
Domain	localhost:*	All ports for localhost-to-localhost communication, which are needed for interprocess communication.
IP Address	192.168.113.*:*	Allow all ports. Communication link with firmware on the network card. If using a proxy server, the following IPs addresses must be reserved: 192.168.113.5 and 192.168.113.2. For more information, contact Illumina Technical Support.
Port	8081	Primary Analysis Software
	8080	NextSeq 550Dx Operating Software (NOS)
	8090	Rich Communication Services (RCS)

Outbound Connections

Connection	Value	Purpose
Domain	s3-external-1.amazonaws.com s3.amazonaws.com *.basespace.illumina.com	Instrument Health

Operating System Configurations

Illumina instruments are tested and verified to operate within specifications before shipping. After installation, changes to settings can create performance or security risks.

The following configuration recommendations mitigate performance and security risks for the operating system:

- ▶ Configure a password that is at least 10 characters, and use local ID policies for additional guidance. **Keep a record of the password.**
 - ▶ Illumina does not keep customer login credentials, and unknown passwords cannot be reset.
 - ▶ An unknown password requires that an Illumina representative restore the factory default, which removes all data from the system and extends the necessary support time.
- ▶ Configure Automatic Updates in Windows to apply critical security updates only.
- ▶ When connecting to a domain with Group Policy Objects (GPOs), some settings might affect the operating system or instrument software. If the instrument software operates incorrectly, consult your facility IT administrator about possible GPO interference.
- ▶ Use the Windows firewall or a network firewall (hardware or software) and disable the Remote Desktop Protocol (RDP). For more information on firewalls and RDP, see the *Illumina Security Best Practices Guide (Pub No. 970-2016-016)*.
- ▶ Maintain administrative privileges for users. Illumina instrument software is configured to allow user permissions when the instrument is shipped.
- ▶ The system has fixed internal IP addresses, which can cause system failure when conflicts occur.

- ▶ The control computer is designed to operate Illumina sequencing systems. Web browsing, checking email, reviewing documents, and other nonsequencing activity creates quality and security problems.

Drive Mapping

Do not share any drives or folders from the instrument.

Map drives to Samba / Common Internet File System (CIFS) on other devices.

In the operating software, use the full UNC path for run output.

Windows Updates

To secure your data, it is recommended that all Windows critical security updates are applied on a regular schedule. The instrument must be idle when updates are applied as some updates require a full system reboot. General updates can put the system operating environment at risk and is not supported.

If security updates are not possible, alternatives to turning on Windows Update include:

- ▶ More robust firewalling and network isolation (virtual LAN).
- ▶ Network isolation of network attached storage (NAS), which still allows for data to sync to the network.
- ▶ Local USB storage.
- ▶ User behavior and management to avoid improper use of the control computer and ensure the appropriate permission-based controls.

For more information on Windows Update alternatives, contact Illumina Technical Support.

Third-party Software

Illumina does not support software beyond what is provided at installation. Do not install Chrome, Java, Box, or any other third-party software that was not provided with the system.

Third-party software is untested and can interfere with performance and security. For example, RoboCopy or other synchronization and streaming programs can cause corrupt or missing sequencing data because it interferes with streaming performed by the control software suite.

User Behavior

The instrument control computer is designed to operate Illumina sequencing systems. Do not consider it a general-purpose computer. For quality and security reasons, do not use the control computer for web browsing, checking email, reviewing documents, or other unnecessary activity. These activities can result in degraded performance or loss of data.

Antivirus Software

An antivirus software of your choice is highly recommended to protect the instrument control computer against viruses.

To avoid data loss or interruptions, configure the antivirus 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 drive from any real-time file system protection. Apply this setting to the C:\Illumina directory and the D:\ drive.

User-Supplied Consumables and Equipment

The following consumables and equipment are used on the NextSeq 550Dx instrument. For more information, see the *NextSeq 550Dx Instrument Reference Guide (document # 1000000009513)*.

User-Supplied Consumables for Sequencing Runs

Consumable	Supplier	Purpose
Alcohol wipes, 70% Isopropyl or Ethanol, 70%	WWR, catalog # 95041-714 (or equivalent) General lab supplier	Flow cell cleaning and general purpose
Lab tissue, low-lint	WWR, catalog # 21905-026 (or equivalent)	Flow cell cleaning and general purpose

User-Supplied Consumables for Instrument Maintenance

Consumable	Supplier	Purpose
NaOCl, 5% (sodium hypochlorite)	Sigma-Aldrich, catalog # 239305 (or laboratory-grade equivalent)	Washing the instrument using the manual post-run wash; diluted to 0.12%
Tween 20	Sigma-Aldrich, catalog # P7949	Washing the instrument using manual wash options; diluted to 0.05%
Water, laboratory-grade	General lab supplier	Washing the instrument (manual wash)
Air filter	Illumina, catalog # 20022240	Cleaning the air the instrument takes in for cooling

Guidelines for Laboratory-Grade Water

Always use laboratory-grade water or deionized water to perform instrument procedures. Never use tap water. Use only the following grades of water or equivalents:

- ▶ Deionized water
- ▶ Illumina PW1
- ▶ 18 Megohms (M Ω) 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
Refrigerator, 2°C to 8°C	General lab supplier

Revision History

Document	Date	Description of Change
Document # 1000000009869 v03	March 2019	Corrected formatting for bandwidth requirement speed.
Document # 1000000009869 v02	January 2019	Added information for NextSeq 550Dx High Output Flow Cell Cartridges v2.5 (300 cycles). Updated installation instructions to note that USB port access is required. Corrected UPS specifications for use in Japan.
Document # 1000000009869 v01	August 2018	Updated regulatory markings.
Document # 1000000009869 v00	November 2017	Initial release.

Technical Assistance

For technical assistance, contact Illumina Technical Support.

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

Illumina Customer Support Telephone Numbers

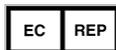
Region	Toll Free	Regional
North America	+1.800.809.4566	
Australia	+1.800.775.688	
Austria	+43 800006249	+43 19286540
Belgium	+32 80077160	+32 34002973
China	400.066.5835	
Denmark	+45 80820183	+45 89871156
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Germany	+49 8001014940	+49 8938035677
Hong Kong	800960230	
Ireland	+353 1800936608	+353 016950506
Italy	+39 800985513	+39 236003759
Japan	0800.111.5011	
Netherlands	+31 8000222493	+31 207132960
New Zealand	0800.451.650	
Norway	+47 800 16836	+47 21939693
Singapore	+1.800.579.2745	
Spain	+34 911899417	+34 800300143
Sweden	+46 850619671	+46 200883979
Switzerland	+41 565800000	+41 800200442
Taiwan	00806651752	
United Kingdom	+44 8000126019	+44 2073057197
Other countries	+44.1799.534000	

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

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



Illumina
5200 Illumina Way
San Diego, California 92122 U.S.A.
+1.800.809.ILMN (4566)
+1.858.202.4566 (outside North America)
techsupport@illumina.com
www.illumina.com



Illumina Cambridge Limited
Chesterford Research Park, Little Chesterford
Saffron Walden, CB10 1XL
UNITED KINGDOM

Australian Sponsor

Illumina Australia Pty Ltd
1 International Court
Scoresby, Victoria, 3179
Australia

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