ion torrent

# Ion S5™ and Ion S5™ XL System

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This guide contains the information needed to prepare your site for installation of an Ion S5™ Sequencer or Ion S5™ XL Sequencer and Torrent Server (required for use with the Ion S5™ XL Sequencer).

## Site preparation workflow

A Thermo Fisher Scientific representative will contact you to schedule the installation. When the installation is scheduled:

1. Receive and inspect the system (see "Receive and inspect the shipment" on page 22).
2. Move the crated instrument to the installation site (see "Move the crated instrument to the installation site" on page 22).
3. Complete the site preparation checklist (see "Site preparation checklist" on page 2).
4. Ensure:
   - The site preparation checklist is complete.
   - The purchase order is complete.

### Installation timeline and training

After the Ion S5™ or Ion S5™ XL System (Cat. nos. A27211 or A27213 ) is uncrated, installation and testing of the Ion S5™ Sequencer or Ion S5™ XL Sequencer and Torrent Server (required for use with the Ion S5™ XL Sequencer) takes ~8 hrs.

The Ion Chef™ Instrument or Ion OneTouch™ 2 Instrument plus Ion OneTouch™ ES Instrument (purchased separately) are installed separately and will require an additional 4–6 hours.

During and/or after installation, the Thermo Fisher Scientific service representative reviews data and provides some basic operator training. For additional training and reference information, see the user documents provided with the Ion S5™ or Ion S5™ XL System.

# Site preparation checklist

**IMPORTANT!** Complete, date, and initial all items in the following checklist before the scheduled installation date. If the site preparation checklist is not complete when the Thermo Fisher Scientific service representative arrives, the scheduled installation may be postponed.

| ✓ | Date | Initials | Site preparation requirement | See page |
|---|---|---|---|---|
| ☐ | | | Customer responsibilities have been reviewed and personnel have been assigned. | 3 |
| ☐ | | | The installation site is identified and meets requirements: | |
| | | | ☐ Space and clearance | 5 |
| | | | ☐ Environmental | 13 |
| | | | ☐ Electrical | 16 |
| | | | ☐ Network | 18 |
| | | | ☐ Safety | 20 |
| ☐ | | | All materials needed for installation and operation are available. | 21 |
| ☐ | | | The instrument was received and inspected: | 22 |
| | | | ☐ All items on the shipping list are the same items ordered at the time of purchase. | |
| | | | ☐ Any damage to shipping containers was reported to the shipping company that delivered the instrument. | |
| | | | ☐ Any damage or mishandling was recorded on the shipping documents. | |
| | | | ☐ The reagents box was unpacked and stored as specified. | |
| ☐ | | | The installation site is cleared and ready for instrument installation. | 22 |
| ☐ | | | The crated instrument and other shipping containers are moved to the installation site. | |

# Customer responsibilities

| Personnel | Responsibilities |
|---|---|
| Site preparation/ installation coordinator | • Reviews the site preparation guide for safety information and instrument requirements.<br>• Coordinates personnel and tasks.<br>• Chooses the site.<br>• Reviews checklists with applicable personnel, then with the service representative to verify that the site is properly prepared.<br>• Receives and inspects the Ion S5™ Sequencer.<br>• Stores the reagents box according to the specifications indicated in the product inserts.<br>• Schedules the installation and informs personnel of the installation day.<br>• Ensures that the site is clear of unnecessary material on the installation day.<br>• Is available to assist the service representative throughout installation. |
| Laboratory safety representative | • Reviews the site preparation guide for safety information.<br>• Ensures that the required safety practices and equipment are in place.<br>• Is in the vicinity and available to the service representative at all times while the service representative is at the customer's facility. |
| Laboratory personnel/ primary users | • Review safety information.<br>• Ensures that all customer-provided materials for installation are present at the site.<br>• Ensures that primary users (responsible for training other users) are available during the installation, so that they can be trained on the instrument. |
| Facilities personnel | • Ensures that the installation requirements are met for:<br>– Space at the installation site<br>– Building clearances<br>– Temperature and humidity<br>– Waste collection<br>– Electrical supply<br>– Computer<br>– Safety and installation materials<br>• If possible, moves the crated Ion S5™ Sequencer to the site before the installation date.<br>• Is available to assist service representative and laboratory personnel throughout installation.<br>• If applicable, ensures that at least two people are available to help the service representative move and position the instrument. |

| Personnel | Responsibilities |
|---|---|
| Network or IT specialist (if the instrument will be connected to a network) | • Ensures that active, tested local area network (LAN) connections are in place before the scheduled installation date.<br>• Ensures that network hardware is compatible with an RJ45-type connector.<br>• If necessary, supplies additional cables.<br>• Is available during installation to connect the Ion S5™ Sequencer to the network.<br>• If applicable, provides and installs a network or dedicated printer.<br><br>**IMPORTANT!** Do not attempt to connect the Ion S5™ Sequencer components to the network before the service representative arrives. |

# Site requirements

## Dimensions and weights

To prepare for installation, provide space for receipt and configuration of the components listed in this section. This section provides dimensions and weights for the crates and packages you will receive, and it describes the dimensions of the Ion S5™ Sequencer after it has been installed and configured.

**IMPORTANT!** We do not install, service, or repair instruments in areas designated BioSafety Level 3 (BSL-3) or BioSafety Level 4 (BSL-4).

### Crates and packages

Ensure the building clearances allow for the passage of the instrument crates and packages.

| Crate | Height | Length (depth) | Width | Weight |
|---|---|---|---|---|
| Ion S5™ Sequencer | 25.5 in (64.8 cm) | 39 in (99 cm) | 28 in (71.1 cm) | 200 lbs (90.7 kg) |
| Ion S5™ XL Sequencer | 25.5 in (64.8 cm) | 39 in (99 cm) | 28 in (71.1 cm) | 200 lbs (90.7 kg) |
| Torrent Server[1] | 28.3 in (71.9 cm) | 27.8 in (70.6 cm) | 13.5 in (34.3 cm) | 116.9 lbs (53.0 kg) |
| Ion Chef™ Instrument | 28 in (71.1 cm) | 34 in (86.4 cm) | 34 in (86.4 cm) | 295 lbs (134.0 kg) |
| Ion OneTouch™ 2 Instrument | 18 in (45.7 cm) | 18 in (45.7 cm) | 21 in (53.3 cm) | 44 lbs (20.0 kg) |
| Ion OneTouch™ ES Instrument | 14.5 in (36.8 cm) | 14.5 in (36.8 cm) | 17.5 in (44.5 cm) | ~13 lbs (5.9 kg) |

[1] required for use with the Ion S5™ XL Sequencer.

### Components

Ensure that the installation site bench space is level and can accommodate the dimensions and support the weights.

| Component | Height | | Length (depth) | Width | | Weight |
|---|---|---|---|---|---|---|
| | Open | Closed | | Open | Closed | |
| Ion S5™ Sequencer | — | 20 in (50.9 cm) | 31.75 in (80.6 cm) | 34 in (86.4 cm) | 21.4 in (54.2 cm) | 140 lb (63.5 kg) |
| Ion S5™ XL Sequencer | — | 20 in (50.9 cm) | 31.75 in (80.6 cm) | 34 in (86.4 cm) | 21.4 in (54.2 cm) | 140 lb (63.5 kg) |
| Torrent Server[1] | — | 17.5 in (44.4 cm) | 27.5 in (69.8 cm) | — | 12.1 in (30.8 cm) | 101.4 lbs (46.0 kg) |
| Ion Chef™ Instrument | 33 in (83.9 cm) | 22.1 in (56.1 cm) | 27.6 in (70.0 cm) | — | 28.1 in (71.4 cm) | 150 lbs (68.2 kg) |
| Ion OneTouch™ 2 Instrument | — | 12 in (30.5 cm) | 16 in (40.6 cm) | — | 14 in (35.6 cm) | 37.5 lbs (17.0 kg) |
| Ion OneTouch™ ES Instrument | — | 9.5 in (24.1 cm) | 12.5 in (31.8 cm) | — | 11 in (27.9 cm) | 12 lbs (5.4 kg) |

[1] required for use with the Ion S5™ XL Sequencer.

## Instrument clearances

During instrument setup and maintenance, it is necessary to access the back and sides of all of the instruments. If the back of the instrument components face a wall, it will be necessary to have enough space to rotate them on the bench for access.

**IMPORTANT!** For safety, the power outlet used for powering the instrument components must be accessible at all times.

| Component | Top | Front | Left/Right | Back |
|---|---|---|---|---|
| Ion S5™ Sequencer[1] | 12.0 in (30.5 cm) | 12.0 in (30.5 cm)[2] | 4.0 in/12 in[3] (10.0 cm/30.5 cm) | 12.0 in (30.5 cm) |
| Ion S5™ XL Sequencer[1] | 12.0 in (30.5 cm) | 12.0 in (30.5 cm)[2] | 4.0 in/12 in[3] (10.0 cm/30.5 cm) | 12.0 in (30.5 cm) |
| Torrent Server | 2.0 in (5.0 cm) | 12.0 in (30.5 cm) | 2.0 in (5.0 cm) | 61.0 cm (24.0 in) |
| Ion Chef™ Instrument | 14 in (35.6 cm) | 6.7 in (17.0 cm) | 4.0 in (10.0 cm) | 4.0 in (10.0 cm) |
| Ion OneTouch™ 2 Instrument | 12.0 in (30.5 cm) | 12.0 in (30.5 cm) | 4.0 in (10.0 cm) | 4.0 in (10.0 cm) |
| Ion OneTouch™ ES Instrument | 12.0 in (30.5 cm) | 12.0 in (30.5 cm) | 12.0 in (30.5 cm) | 4.0 in (10.0 cm) |

[1] clearance requirements for both Ion S5™ Sequencers is identical.

[2] The instrument requires 36.0 in (90.0 cm) aisle in front of bench for operator access.

[3] To allow sufficient clearance for the instrument door to open.

## Placement of the instrument and server

If any of the instruments will be placed on a mobile bench, verify that the bench is level and meets the requirements in “Components“ on page 5.

**IMPORTANT!** The Ion S5™ Sequencer must be installed on a level surface.

**Note:** Thermo Fisher Scientific is not responsible for any damage caused by using a laboratory bench that does not meet the minimum weight capacity requirements mentioned above.

## Laboratory layout of the Ion S5™ Sequencer and Torrent Server

The Ion S5™ Sequencer contains an internal virtual Torrent Server and only requires connection to a local area network (see Figure 1). For the Ion S5™ XL Sequencer, we support the layout in which the Torrent Server is directly connected to the sequencer (see Figure 2), rather than through the local area network from a remote location such as a server room. Data are most robustly transferred from the Ion S5™ XL Sequencer to the Torrent Server when they are directly connected by a category 6 Ethernet cable provided with the installation materials.

**IMPORTANT!** The Ion S5™ XL Sequencer must be connected to the Torrent Server by a category 6 Ethernet cable. We do not troubleshoot data transfer issues associated with an indirect connection between the Ion S5™ XL Sequencer and the Torrent Server.

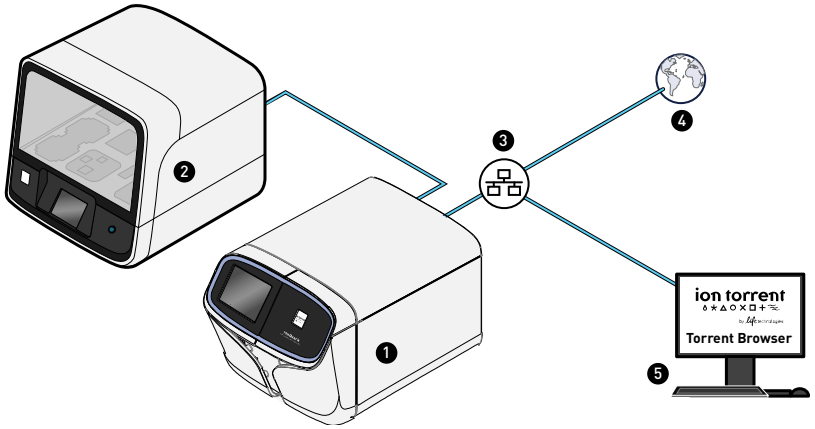


**Figure 1** Ion S5™ Sequencer configuration

1. Ion S5™ Sequencer
2. Ion template preparation instrument (Ion Chef™ Instrument (shown) or Ion OneTouch™ 2 System)
3. Local area network
4. Internet
5. Client computer

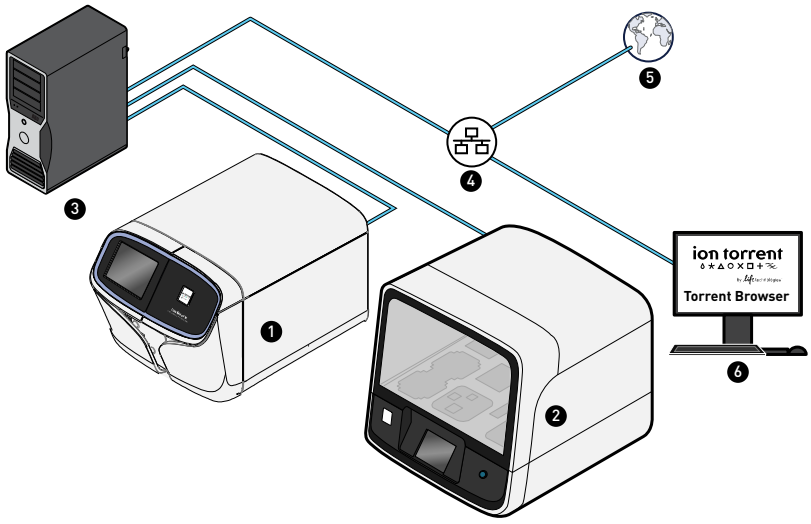


**Figure 2** Ion S5™ XL Sequencer configuration

1. Ion S5™ XL Sequencer
2. Ion template preparation instrument (Ion Chef™ Instrument (shown) or Ion OneTouch™ 2 System)
3. Torrent Server
4. Local area network
5. Internet
6. Client computer

**Note:** In either configuration the Ion Chef™ Instrument must be connected to the Torrent Server either directly using a category 6 Ethernet cable, or indirectly through a local area network that has been configured to permit HTTP-443, SSH-22, and FTP-20/21 traffic. Unlike the Ion S5™ Sequencers, the Ion Chef™ Instrument does not require a robust network connection to the Torrent Server and can accommodate standard network connection speeds.

## Internet connectivity

The Ion S5™ Sequencer or the Torrent Server should be connected to a network with internet access. Connecting to the internet allows you to easily update your software and access remote system support. Software updates through the network/internet are free. If you choose not to connect your instrument or server to a network, software updates will need to be manually installed via USB.

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**IMPORTANT!** The USB method for updating is not supported by Thermo Fisher Scientific.

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Any issues (file corruption, incomplete updates, etc.) updating the sequencer or server in this manner requiring correction of the faulty update is not covered by your Ion S5™ or Ion S5™ XL Sequencer warranty or any service contract you may have purchased. You will be required to schedule an on-site Time and Materials visit by a Thermo Fisher Scientific field service engineer to correct the problem at your own expense.

In providing outbound access to the internet from the server, you enable the Thermo Fisher Scientific support team to provide inbound support. Both the Ion S5™ Sequencer and the Torrent Server run a remote monitor agent that can provide service personnel with critical system information, such as installed software versions and instrument alarms. With your permission, the agent also allows service personnel to remotely log into the Ion S5™ Sequencer and the Torrent Server, which is required for

system support. Without remote access, service personnel cannot access, view, and troubleshoot issues regarding machine performance.

To enable full support, the Torrent Server must have outbound internet access (ports 22, 80, and 443) and be behind an appropriately configured firewall. While not recommended, you can enable access to the Torrent Browser (the web server running on the Torrent Server from the Internet). If you provide such access, you must restrict access to the server using HTTP and AUTH firewall rules, or a combination of the two. Implementing and maintaining such restrictions is the responsibility of the customer's server administrator and not of Thermo Fisher Scientific.

**Note:** For answers to common questions about Torrent Server network access requirements, refer to the frequently asked questions (FAQ) and the *Torrent Server Administrator Guide* in the Torrent Suite section of the Ion Community website (**http://ioncommunity.thermofisher.com**). The FAQ provides information that you can use to prepare Ion S5™ Systems and servers within the umbrella policies of your site.

## Planning the installation

In preparation for the Ion S5™ Sequencer installation, you must plan the layout of your laboratory to accommodate library and template preparation activities, in addition to those related to chip preparation and sequencing. This section describes the stations involved in the sequencer workflow and the basic laboratory layouts.

### Layout of instrument components and equipment

When designing your PCR laboratory layout, follow good laboratory practices to ensure reliable and contamination-free PCR results. Pay particular attention to the need to separate the areas for pre- and post-PCR activities. Isolating the amplicon source, separating pre-PCR from post-PCR activities, and dedicating laboratory supplies and/or equipment to each space can significantly reduce the potential for contamination.

As shown in the illustrations below, the Ion S5™ Sequencer can be deployed in both one- and two-room laboratory configurations. The two-room layout is highly recommended due to the protection that it affords against contamination; however, the sub-optimal one-room layout will produce acceptable results if proper precautions are observed.

If you choose to deploy the Ion S5™ Sequencer in a one-room layout:

- Establish clearly-labeled, separate sets of pipettes for the library preparation, emulsion PCR (emPCR) setup, and emulsion breaking stations.
- Always move from "clean" to "dirty" (for example, from pre- to post-PCR). We do not recommend moving from "dirty" to "clean" (for example, do not handle post-amplification samples and then make libraries).

**Note:** The positions of the stations in the pre-and post- PCR rooms are not important.

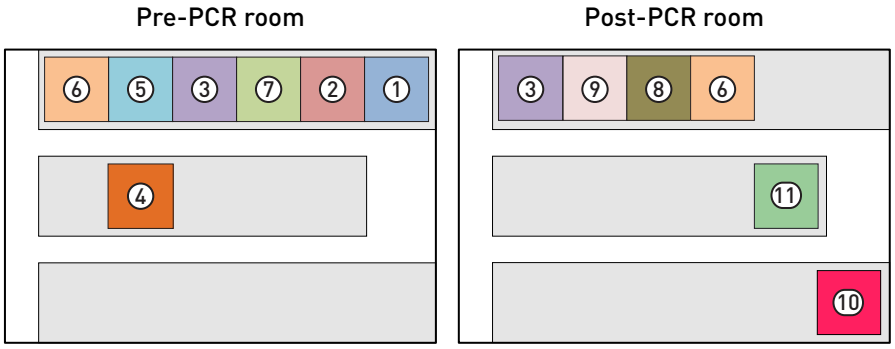



**Figure 3** Two-room layout

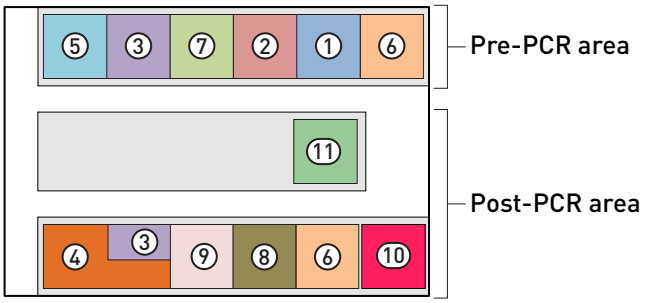



**Figure 4** One-room layout

1. Agilent® 2100 Bioanalyzer® instrument
2. (*Optional*) Bioruptor® system
3. Centrifuge
4. Amplification mixture setup hood
5. Library area setup hood
6. Pipettes
7. (*Optional*) Pippen Prep™ instrument
8. Qubit® system
9. Thermal cycler
10. Ion Chef™ or Ion OneTouch™ 2 System
11. Ion S5™ Sequencer *or* Ion S5™ XL Sequencer and Torrent Server

## Laboratory workstations

The following table describes workstations associated with the generic laboratory layout for the Ion S5™ Sequencer. The stations are categorized in terms of their involvement pre- and post-PCR activities. Note that some stations (pipette and centrifuge) are present in both environments, but the equipment is not necessarily shared between the pre- and post-PCR stations.

| # | Station | Location | Description/requirements |
|---|---|---|---|
| 1 | Agilent™ 2100 Bioanalyzer™ Instrument | Pre-PCR area | Use the Agilent™ 2100 Bioanalyzer™ Instrument to perform library construction quality control, providing yield and size characterization. When planning the instrument placement, consider isolating the Agilent™ 2100 Bioanalyzer™ Instrument from the sequencer, preferably in a room dedicated for library preparation, to minimize contamination.<br>**Note:** If necessary, you can substitute a qPCR instrument for the Agilent™ 2100 Bioanalyzer™ Instrument. In general, qPCR does not yield size distribution but does provide more accurate counts. |
| 2 | (Optional) Bioruptor® System | Pre-PCR area | If required, the Bioruptor® Instrument performs acoustic shearing/ fragmentation of DNA samples for library preparation. You can perform DNA shearing through the use of a Covaris® Focused-Ultrasonicator or the Ion Express Library Kit, both of which are acceptable substitutes for the Bioruptor® Instrument. Mechanical shearing is recommended (using Bioruptor® or Covaris® instruments), but enzymatic shearing is acceptable and can be less expensive.<br>When planning Bioruptor® or Covaris® instrument placement:<br>• Consider placing the instrument in an isolated room to minimize the noise hazard.<br>• Consider isolating the instrument from the sequencer, preferably in a dedicated room for library preparation, to minimize contamination. |
| 3 | Centrifuges | Pre- and post-PCR areas | Use centrifuges during library preparation and chip loading, so access is required in both the pre- and post-PCR areas.<br>When planning centrifuge placement:<br>• Consider dedicating separate centrifuges for the pre- and post-PCR operations to minimize contamination.<br>• If only one centrifuge is available, place it in a central location, which is accessible from both areas.<br>• Most importantly, place the centrifuges in convenient locations. |

| # | Station | Location | Description/requirements |
|---|---|---|---|
| **4** | Amplification mixture setup hood | Pre-PCR area | Whenever possible, perform amplification mixture preparation within a dedicated hood.<br>When selecting a location for amplification mixture preparation:<br>• The amplification mixture setup station requires a set of dedicated pipettes.<br>• If only one hood is available within the pre-PCR area, dedicate the hood for amplification mixture preparation and perform library preparation elsewhere.<br>• If a hood is unavailable within the pre-PCR area, select a bench that is sterilized regularly and preferably isolated from the neighboring stations.<br>**IMPORTANT!** Separation of the amplification mixture preparation area from the other stations is critical to preventing contamination.<br>**IMPORTANT!** If possible, physically separate the library and amplification mixture setup areas. |
| **5** | Library area setup hood | Pre-PCR area | Whenever possible, perform library preparation within a dedicated hood. The use of a dedicated hood allows for UV treatment of the library preparation area and minimizes contamination from post-PCR material containing adaptors.<br>When selecting a location for library preparation:<br>• In a one-room laboratory layout, we highly recommend the use of a dedicated hood for library preparation, but not required.<br>• The library area setup station requires a set of dedicated pipettes.<br>• If a dedicated hood is unavailable, select a bench that is preferably isolated from the neighboring stations. |
| **6** | Pipettes | Pre- and post-PCR areas | Both the pre- and post-PCR areas require a complete set of dedicated pipettes. If necessary, you can share the pipettes between neighboring stations, except for the amplification mixture and library setup stations, both of which require dedicated sets of pipettes. |
| **7** | (Optional) Pippin Prep™ Instrument | Pre-PCR area | If required, use the Pippin Prep™ Instrument to perform automated size selection prior to template preparation. Use of the Pippin Prep™ Instrument is necessary only if you require size selection for your sample type.<br>**Note:** You can also do Size selection through the use of the Invitrogen E-Gel® Agarose Gel Electrophoresis and Documentation System, an acceptable substitute for the Pippin Prep™ Instrument. |
| **8** | Qubit™ System | Post-PCR area | You can use the Qubit™ 2.0 or the Qubit™ 3.0 System to perform library quantification or quality control following PCR or just prior to library preparation. When selecting a location for the instrument, place the Qubit™ System close to the Ion OneTouch™ 2 Instrument. |

| # | Station | Location | Description/requirements |
|---|---|---|---|
| **9** | Primer-Annealing Thermal Cycler | Post-PCR area | Use a 96-well thermal cycler to perform the primer-annealing step during template preparation. When selecting a location for the thermal cycler, confirm that the location meets all clearance and environmental requirements for the instrument.<br><br>**Note:** If you are using Ion AmpliSeq™ Primers, a pre-PCR thermal cycler is required in the pre-PCR room.<br><br>**Note:** Primer-annealing thermal cycler is not required if using the Ion Chef™ System for template preparation. |
| **10** | Ion Chef™ or Ion OneTouch™ 2 System | Post-PCR area | When planning the placement of the Ion Chef™ or Ion OneTouch™ 2 System, confirm that the location meets all clearance and environmental requirements described in this document.<br><br>**Note:** If possible, install the Ion S5™ Sequencer and Ion Chef™ instrument to a dedicated power outlet. |
| **11** | Ion S5™ Sequencer or Ion S5™ XL Sequencer and Torrent Server | Post-PCR area | When planning the placement of the Ion S5™ XL Sequencer and Torrent Server, confirm that the location meets all clearance and environmental requirements described in this document.<br><br>**IMPORTANT!** The Ion S5™ Sequencers are sensitive to both electrical noise and temperature changes.<br><br>**Note:** Because the Torrent Server requires a direct connection to the Ion S5™ XL Sequencer via a standard Category 6 Ethernet cable, the server is typically installed to the bench directly beneath the instrument. |

## Environmental requirements

Ensure that the installation room is maintained under correct environmental conditions. Avoid placing the sequencer or server adjacent to heaters, cooling ducts, or in direct sunlight. Place the sequencer at least 1 meter away from major sources of electronic noise such as refrigerators or microwaves. Fluctuations between day and night temperatures can cause system instability.

| Component | Acceptable range |
|---|---|
| Altitude | Located between sea level and 6500 ft (2000 m) above sea level |
| Humidity | **Ion S5™ or Ion S5™ XL Sequencer**: 40-60%, non-condensing<br>**Torrent Server**: 20-80%, non-condensing<br>**Ion Chef™ Instrument**: 40-60%, non-condensing<br>**Ion OneTouch™ 2 Instrument/Ion OneTouch™ ES Instrument**: Relative humidity 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C |
| Operating Temperature | **Ion S5™ or Ion S5™ XL Sequencer**: 20°C to 30°C (68°F to 86°F)<br>**Note:** The room temperature must not fluctuate more than 2°C over a 2-hour period.<br>**Torrent Server**: 10°C to 35°C (50°F to 95°F)<br>**Ion Chef™ Instrument**: 20°C to 25°C (68°F to 77°F)<br>**Ion OneTouch™ 2 Instrument/Ion OneTouch™ ES Instrument**: 20°C to 25°C (68°F to 77°F) |
| Vibration | Install the instrument(s) on benches that have no contact with equipment that causes vibration (freezers, pumps, and similar equipment). Significant vibration during sequencing can add noise and reduce the quality of the sequencing measurements.<br>**Note:** Where possible we recommend placing the Ion Chef™ Instrument on a separate bench from the Ion S5™ Sequencer as the Ion Chef™ Instrument can itself cause vibration. |
| Pollution | The Ion S5™ and Ion S5™ XL Sequencers, and the Ion Chef™ Instrument, Ion OneTouch™ 2 Instrument, and Ion OneTouch™ ES Instrument are intended to be used in Office or Laboratory controlled environments. |
| Overvoltage category | The Ion S5™ and Ion S5™ XL Sequencers, Ion Chef™ Instrument, Ion OneTouch™ 2 Instrument, and Ion OneTouch™ ES Instrument have installation (overvoltage) categories of II (2), and are classified as portable equipment. |
| Other conditions | For indoor use only. Install the Ion S5™ Sequencer on a level surface. The installation location must be away from any vents that could expel particulate material on the system components. |

### Thermal specifications for the instrument and server

During operation, the thermal output based on the typical current draw of the components are:

| Component | Typical draw (W) | Thermal output (BTU/h) |
|---|---|---|
| Ion S5™ Sequencer | 520[1] | 1774 |
| Ion S5™ XL Sequencer | 700[2] | 2388 |
| Torrent Server[3] | 1100 | 3753 |
| Ion Chef™ Instrument | 990 | 3378 |
| Ion OneTouch™ 2 Instrument | 550 | 1877 |
| Ion OneTouch™ ES Instrument | 410 | 1399 |

[1] Ion S5™ Sequencer maximum draw: 1350W

[2] Ion S5™ XL Sequencer maximum draw: 1350W

[3] Minimum Efficiency: 65% (Energy Star Qualified); 85% Efficient Power Supply.

## Ventilation requirements

Allow at least 10 cm (4 in.) of clearance around the Ion S5™ System for ventilation. Do not block air inlets or outlets to allow proper ventilation.

## Cleaning or decontamination

Refer to the user documentation for your Ion S5™ Sequencer for information on how to clean or decontaminate the instrument.

Wear appropriate protection, including gloves, laboratory goggles, and coat whenever you work with the fluids used on this instrument, or parts that may come into contact with these fluids.

Use only the cleaning agents as described in the user documentation for your Ion S5™ Sequencer. Use of cleaning agents not described in this manual can impair the instrument. Contact Technical Support if you have questions.

Wipe off any liquid on or around the instrument using a lint-free tissue.

## Disposing of waste

**WARNING! CHEMICAL HAZARD**. Refer to Safety Data Sheets (SDSs) and local regulations for handling and disposing of plastic consumables. Follow local municipal waste ordinances for proper disposal provisions to reduce the environmental impact of plastic consumables.

**WARNING! DANGER CHIMIQUE**. Consulter les fiches de données de sécurité (FDS) et les réglementations locales en matière de manipulation et d'élimination des consommables en plastique. Se conformer à la réglementation locale relative à l'élimination des déchets usuels pour réduire l'impact environnemental des consommables en plastique.

**WARNING! CHEMICAL HAZARD**. Before handling chemicals, refer to the Safety Data Sheet (SDS) provided by the manufacturer, and observe all relevant precautions.

**WARNING! DANGER CHIMIQUE**. Avant de manipuler des produits chimiques, se référer à la fiche de données de sécurité (FDS) fournie par le fabricant et respecter toutes les précautions d'usage.

**WARNING! CHEMICAL HAZARD**. All chemicals in the instrument, including liquid in the lines, are potentially hazardous. Always determine what chemicals have been used in the instrument before changing reagents or instrument components. Wear appropriate eyewear, protective clothing, and gloves when working on the instrument.

**WARNING! DANGER CHIMIQUE**. Tous les produits chimiques contenus dans l'instrument, notamment le liquide dans les lignes, sont potentiellement dangereux. Toujours déterminer les produits chimiques utilisés dans l'instrument avant le remplacement de réactifs ou de composants de l'instrument. Porter des gants, des vêtements de protection et des protections oculaires appropriés lors de toute intervention sur l'instrument.

**WARNING! CHEMICAL HAZARD**. Waste produced by instruments can be hazardous and can cause injury or illness.

**WARNING! DANGER CHIMIQUE** Les déchets produits par les instruments peuvent être dangereux et entraîner des blessures ou des maladies.

## Electrical requirements

**WARNING!** For safety, the power outlet used for powering the instrument must be accessible at all times. See “Instrument clearances“ on page 5 for information about the space needed between the wall and the instrument. In case of emergency, you must be able to immediately disconnect the main power supply to all the equipment. Allow adequate space between the wall and the equipment so that the power cords can be disconnected in case of emergency.

**WARNING!** Par souci de sécurité, la prise de courant alimentant l’instrument doit être accessible à tout moment. En cas d’urgence, il doit être possible de débrancher immédiatement l’alimentation principale de l’ensemble des équipements. Laisser suffisamment d’espace entre le mur et les équipements afin de pouvoir débrancher les câbles d’alimentation sans encombre, en cas d’urgence.

- Electric receptacle required: 2-prong with ground pin
- Mains AC line voltage tolerances must be up to ± 10% percent of nominal voltage

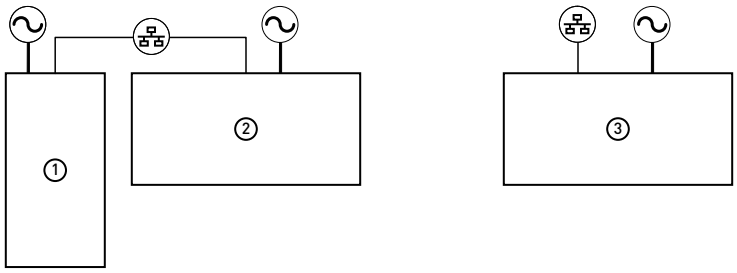
| Component | Input voltage (VAC) | Frequency (Hz) | Rated Current (A)[1] |
|---|---|---|---|
| Ion S5™ Sequencer | 100-240 | 50/60 | 14.5–6.0 |
| Ion S5™ XL Sequencer | 100-240 | 50/60 | 14.5–6.0 |
| Torrent Server[2] | 90-265 | 50/60 | 12 |
| Ion Chef™ Instrument | 100-240 | 50/60 | 12 |
| Ion OneTouch™ 2 Instrument | 100-240 | 50/60 | 5.5 |
| Ion OneTouch™ ES Instrument | 99-132/198-264 | 50/60 | 0.5 |

[1] Based on rated current at minimum input voltage

[2] Minimum Efficiency: 65% (Energy Star Qualified); 85% Efficient Power Supply.

### Electrical requirements for the Ion S5™ System and Torrent Server

Use an approved UL Listed detachable power supply cord to connect the sequencer to the wall. Route power cords away from the workspace to avoid accidental disconnection.




① Torrent Server
② Ion S5™ XL Sequencer
③ Ion S5™ Sequencer

Power cords are provided with the instrument. If not suitable for installation in your region, ensure any power cord you do use is:

- Maximum 10ft (3m) in length
- Grounding type
- Compatible with the power supply receptacles used to connect to main power
- Suitable for the rating of the instrument and mains power supply
- Compliant with local safety requirements (for example, UL Listed for North America, JIS approved for Japan, HAR or agency certified for Europe)

### Electrical requirements for the Ion OneTouch™ Instrument

- Use the external power supply provided with the instrument.
- Facility to supply via building code compliant 15A circuit.
- Use an approved UL Listed detachable power supply cord, as supplied, to connect the system to the wall.

## Electrical protective devices

We recommend several protective devices to protect the system in environments with large voltage and power fluctuations.

| Device | Description |
|---|---|
| Power line regulator | We recommend the use of a 1.5-kVA power line regulator in areas where the supplied power fluctuates in excess of ± 10% of the normal voltage. Power fluctuations can adversely affect the function of the instrument and computer.<br>**Note:** A power line regulator monitors the input current and adjusts the power supplied to the instrument or computer. It does not protect against a power surge or failure. |
| Uninterruptible power supply (UPS) | We recommend the use of a 1.5-kVA uninterruptible power supply (UPS), especially in areas prone to power failure. Power failures and other events that abruptly terminate the function of the instrument and computer can corrupt data and possibly damage the system.<br>⚠ **WARNING! PHYSICAL INJURY HAZARD.** Do not attempt to lift the UPS unit without assistance of at least two people. Improper lifting can cause painful and permanent back injury. Refer to the UPS manufacturer user guide for more information.<br>⚠ **WARNING! RISQUE DE BLESSURES CORPORELLES.** Ne pas essayer de soulever l'onduleur sans l'aide d'au moins deux personnes. En soulevant incorrectement l'appareil, l'opérateur risque de se blesser au dos de façon permanente. Voir le guide de l'utilisateur du fabricant de l'onduleur pour plus d'informations.<br>**IMPORTANT!** UPSs provide power for a limited time. They are meant to delay the effects of a power outage, not to serve as replacement power sources. In the event of a power loss, power off the instrument and computer unless you expect to regain power within the battery life of the UPS. |
| Surge protector | We recommend the use of a 10-kVA surge protector (line conditioner) in areas with frequent electrical storms or near devices that are electrically noisy, such as refrigerators, air conditioners, or centrifuges. Short-duration, high-voltage power fluctuations can abruptly terminate the function of, and thereby damage the components of, the computer and the instrument.<br>**Note:** A dedicated line and ground between the instrument, computer, and the building's main electrical service can also prevent problems caused by power fluctuations. |

## Network requirements

The Torrent Server is factory-configured for the TCP/IP protocol. The product includes a fast Ethernet adapter (10/100Mbps) with an RJ45-type connector and one 3-m (9.8-ft) crossover Ethernet cable that connects the computer and the instrument.

For the instrument to be connected to a LAN, an active, tested LAN connection must be in place before the scheduled installation date.

You must supply a standard Category 6 Ethernet cable of the required length to connect the computer to your LAN.

### Network configuration

The following requirements must be met before installation of the Torrent Server. Discuss any discrepancies in the checklist with your field service representative prior to the visit.

- An information technologies resource must be available to assist with the network connection on the date that the Torrent Server will be installed.
- A static (or dynamic) IP address must be reserved for the Ion S5™ Sequencer or Torrent Server.

  **Note:** If necessary, field service can provide the Ion S5™ Sequencer or Torrent Server's MAC address prior to the installation.
- The room where the Torrent Server will be deployed must contain at least one active network jack.
- The site DNS Server must be configured for the Torrent Server so that users can access the server URL from their workstations.
- The Ion S5™ Sequencer and/or the Torrent Server must be protected behind an appropriately configured network firewall and have outbound internet access as described below.

  **Note:** While not recommended, you can enable access to the Torrent Server from the internet (via the web server running on the Torrent Server). If you provide such access, you must restrict access to the server using HTTP and AUTH firewall rules, or a combination of the two. Implementing and maintaining such restrictions is the responsibility of the server administrator and not of Thermo Fisher Scientific.
- The Ion S5™ Sequencer and Torrent Server require outbound Internet access through HTTP/port-80 to **http://ionupdates.com** and **http://us.archive.ubuntu.com** to retrieve software updates.

  **Note:** The Ion S5™ Sequencer and Torrent Server require an efficient Internet connection to download software updates. If they are isolated from the Internet, you must download and install updates manually to the server.

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  **IMPORTANT!** Manually installing server updates is not supported by Thermo Fisher Scientific. If you choose to download the updates to a USB and manually update the Torrent Server you do so at your own risk. Any issues updating the server in this manner requiring Thermo Fisher Scientific intervention are not covered by the warranty or any service contract you may have purchased. You will need to schedule an on-site visit by your field service engineer at your own expense.

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- The Ion S5™ Sequencer and Torrent Server require outbound Internet access through HTTPS/port-443 and SSH/port-22 to allow us to provide remote support via the Axeda Remote System Monitoring (RSM) Agent. The server includes the Axeda Agent to assist you in maintaining your Ion S5™ or Ion S5™ XL System and to provide timely technical support (for more information, see **http://www.axeda.com/community/customers/applied-biosystems**).

At minimum, whitelist the following outbound addresses for the server:

- drm.appliedbiosystems.com on HTTPS (443)
- rssh.iontorrent.net on SSH (22)

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**IMPORTANT!** Without access through HTTPS/port-443 and SSH/port-22, we cannot support your site in a timely fashion and we may forego remote support for your site altogether at our discretion.

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**Note:** The Axeda Agent is already in use with the Ion PGM™ and Ion Proton™ Sequencers to perform instrument diagnostics, preventive maintenance, failure prediction, and proactive notification. The agent does not collect any sequencing reports, results, or data. For more information on the Axeda Agent, see: **http://lifetech-it.hosted.jivesoftware.com/message/1546#1546**

- If the Ion S5™ System will be installed without a connection to a local area network, then you must provide a router to access data generated by the Ion S5™ Sequencer. Connection and configuration of the router is not the responsibility of the field service engineer.
- If the Torrent Server will be more than 10 feet from the Ion S5™ XL Sequencer , you must provide a standard Category 6 Ethernet Cable of sufficient length at the time of installation.

  **Note:** The supported configuration of the Ion S5™ XL Sequencer is a direct connection between the instrument and the server.
- Use a shielded Ethernet cable when connecting the Torrent Server to the Ion OneTouch™ 2 Instrument.

## Safety requirements

### Safety practices

A safety representative from your facility must ensure that:

- Personnel establish and follow all applicable safety practices and policies to protect laboratory personnel from potential hazards.
- All applicable safety devices and equipment are available at all times.

### Required safety equipment

Your laboratory has specific safety practices and policies designed to protect laboratory personnel from potential hazards that are present. Follow all applicable safety-related procedures at all times.

The following safety equipment and protection from hazards must be available at the installation site:

- Protection from any sources of hazardous chemicals, radiation (for example, lasers, radioisotopes, radioactive wastes, and contaminated equipment), and potentially infectious biological material that may be present in the area where the service representative will work.
- Eyewash
- Safety shower
- Eye and hand protection
- Adequate ventilation, including vent line/fume hood, if applicable
- Biohazard waste container, if applicable

- First-aid equipment
- Spill cleanup equipment
- Applicable Safety Data Sheets (SDSs)

# Materials for installation and operation

## Installation checklist

Refer to the *Ion S5™ System Pre-Installation Checklist* for the materials required for instrument installation. The checklist specifies the materials that must be present onsite before installation and subsequent training can take place.

## Installation kit

The Ion S5™ Installation Kit (Cat. no. A27215) is available to first-time owners of the Ion S5™ or Ion S5™ XL Systems and is shipped with the instrument. The kit contains the core reagents and controls used during the installation, training, and operation of the instruments.

| Ion S5™ Installation Kit (Part no. A27215)[1] | | | |
|---|---|---|---|
| **Components** | **Part no.** | **Quantity** | **Shipping and storage** |
| Ion 540™ Chip Kit | A27765 | 4 pack | 15°C to 30°C |
| Ion S5™ Sequencing Solutions Kit | A27767 | 1 | 15°C to 30°C |
| Ion S5™ Sequencing Reagents Kit | A27768 | 1 | –30°C to –10°C |
| Ion 540™ Control Ion Spheres | A28195 | 1 | –30°C to –10°C |
| Ion 540™ Loading Reagents OT2 | A27897 | 1 | –30°C to –10°C |
| Ion S5™ Cartridge Tool | A28308 | 2 | –20°C to 30°C |
| Ion S5™ Chip Balance | A29022 | 1 | –20°C to 30°C |

[1] Not available for separate purchase.

## Operation

Additional supplies and consumables are necessary for routine operation of the Ion S5™ Sequencer. Contact a sales representative to order these additional supplies. Use only supplies as specified by Thermo Fisher Scientific.

## Materials for template and library preparation

For a complete list of the materials and equipment required for template and library preparation, see the documentation on the Ion Community website (**http://ioncommunity.thermofisher.com/community/protocols-home**).

# Receive and inspect the shipment

1. Verify that the items shown on the shipping list are the same items that you ordered at the time of purchase.
2. Carefully inspect the shipping containers and report any damage to the service representative. Record any damage or mishandling on the shipping documents.
3. Immediately unpack the reagents or installation kit box (boxed separately from the instrument components) and store as specified.

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**IMPORTANT!** Do not unpack shipping containers, except for the reagents or installation kit box, to protect yourself from liability if any damage occurred during shipping.

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# Move the crated instrument to the installation site

1. Clear the installation site of all unnecessary materials.
2. If possible, move the crated instrument and other shipping containers to the installation site. Do not uncrate.

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**IMPORTANT!** Do not tip the crated instrument on end. Tipping may damage the instrument hardware and electronics.

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**Note:** After installation, retain the crate and instrument packaging in case you need to relocate the instrument.

# Related documentation and support

## Related documentation

| Document | Pub. no. | Description |
|---|---|---|
| *Ion S5™ and Ion S5™ XL Instrument User Guide* | MAN0010811 | Describes the Ion S5™ System hardware and software and provides information on preparing, maintaining, and troubleshooting the system. |
| *Ion S5™ and Ion S5™ XL Systems Pre-Installation Checklist* | MAN0013777 | Describes the tasks that you should complete before installation, and details the materials that you will need for a successful Ion S5™ System installation and training. |

## Customer and technical support

Visit **thermofisher.com/support** for the latest in services and support, including:

- Worldwide contact telephone numbers
- Product support, including:
  - Product FAQs
  - Software, patches, and updates
- Order and web support
- Product documentation, including:
  - User guides, manuals, and protocols
  - Certificates of Analysis
  - Safety Data Sheets (SDSs; also known as MSDSs)

  **Note:** For SDSs for reagents and chemicals from other manufacturers, contact the manufacturer.

## Limited product warranty

Life Technologies Corporation and/or its affiliate(s) warrant their products as set forth in the Life Technologies' General Terms and Conditions of Sale found on Life Technologies' website at **www.lifetechnologies.com/termsandconditions**. If you have any questions, please contact Life Technologies at **www.lifetechnologies.com/support**.

The information in this guide is subject to change without notice.

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